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# A KEY

TO

# ORGANIC MATERIA MEDICA.

# A KEY

TO

# Organic Materia Medica,

WRITTEN FOR THE STUDENTS OF
THE SOUTH-LONDON SCHOOL OF PHARMACY.

BY

**DR. JOHN MUTER, M.A., F.C.S.,**
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AND MEDICAL STUDENTS," ETC.
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# Preface to the Second Edition.

IN issuing this new and enlarged edition, I have thought it advisable to depart from the former arrangement—suited, as it was, only to our Museum—and to give the book the form usually adopted by writers on *Materia Medica.*

This has afforded me the opportunity of introducing short descriptions of the Classes, Sub-Classes, Orders, and Sub-orders, both of the Vegetable and Animal Kingdoms; and the whole work is now strictly on the basis of the most modern natural systems of classification. While carrying out this change, however, the book is still rendered a guide to the working drawers of the Museum, by having them catalogued in a tabulated Appendix for use during recognition.

In the Chemical portion, which has been made as complete as space will allow, the researches of others, now become, as it were, stereotyped—have been followed in cases where I have not had the opportunity of repeating the experiments, or where my own observation has fully borne them out; but I have not hesitated to depart from the beaten track in certain points where special experience in the analysis of the drug in question has led me to form different conclusions. A distinct feature has been made of the separation and tests for active principles, so as to aid analysts in their work on drugs; and under the head of "Specially Distinctive Tests" will be found a sort of qualitative course, verified by experiments, which, if followed step by step, will lead to the detection of the article under examination. I propose, in a future edition, to greatly extend these tables; but their arrangement, and the verification of those proposed by others, is a work of so much time, that I have not been able to carry out all I desired at present. In a word, the whole book has been practically re-written, and, I hope, has been materially improved in every respect.

The Therapeutical portion of the work has been purposely kept down to the merest recognised generalities, as I consider that, beyond such a point, the inculcation of special views on therapeutics are best left in the hands of the lecturers; and thus the reading of the book by Students will in no way interfere with the doctrines inculcated in their respective Schools of Medicine and Pharmacy.

I have appended some directions on the microscopic mounting and observation of the chief starches of articles of *Materia Medica* and food, in the form of a qualitative course for their detection. This system, originally made public by me in the "*Analyst*" for December, 1876, is one which I elaborated, and have for many years used in the teaching of Microscopy as applied to drugs. It was specially adapted for use with any ordinary microscope, and with no very excellent arrangement of light, so as to enable an ordinary observer to make tolerably shrewd conclusions. The measurements were adopted from the carefully-collated results of the examination of over 1000 samples, and may be relied upon as good averages, disregarding extremes. It was my intention to have published illustrations of each of the drugs referred to in the Appendix; but through the sudden exhaustion of the first edition, I have been compelled to publish without them.

I have to acknowledge the valuable assistance of my friend, Mr. JOSEPH INCE, in revising the proof sheets and aiding in securing the correctness of the typography, as well as in preparing the Index, which will be found very complete. The annotated Catalogue to the working drawers of the Museum is supplied by our *Materia Medica* Demonstrator, Mr. DODD.

J. M.

*South-London School of Pharmacy,*
*March*, 1878.

# Preface to the Third Edition.

THIS Edition has been issued owing to the unexpectedly rapid exhaustion of the last, in almost the same form, simply correcting the few printer's *errata* found therein. Additional information is given in a new Appendix.

J. M.

*May*, 1879.

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## *Appendices.*

I.—A Classification and Description of the Chief Starches existing in the Commoner Articles of Materia Medica and Food.

II.—Museum Cabinet.—Drawers for the Recognition of Materia Medica Specimens arranged for the use of Students.

III.—The Lemon and Lemon Juice.

# MATERIA MEDICA

OF THE

# VEGETABLE KINGDOM.

# SUB-KINGDOM I.—PHANEROGAMIA.

FLOWERING PLANTS PROPAGATED BY SEEDS.

## CLASS I.—DICOTYLEDONES.

Plants having 2 cotyledons in the seed; germination exorhizal; root true or tap-shaped; stem exogenous; leaves usually reticulated in venation; parts of the flowers arranged in multiples of four or five.

### DIVISION I.—ANGIOSPERMIA.

Plants having their ovules enclosed in an ovary.

### SUB-CLASS I.—THALAMIFLORÆ.

Having the calyx and corolla usually distinct and the stamens hypogynous.

### NATURAL ORDER.—RANUNCULACEÆ.

Usually herbs with a watery acrid juice; leaves divided and without evident stipules; calyx 3—6 sepals, deciduous; corolla 3—15 petals, sometimes suppressed; æstivation imbricate; stamens indefinite and hypogynous, with adnate anthers; pistil apocarpous and superior; fruit achenia, follicles, or rarely baccate; seeds with horny albumen.

**ACONITI FOLIA.**—The fresh leaves and flowering tops of *Aconitum Napellus*, cultivated in Britain.

**ACONITI RADIX.**—The dried root of the same plant, imported from Germany, or cultivated in Britain.

**Botanical Source.**—The *Aconitum Napellus (Aconite, Monkshood, Wolfsbane)* is an herbaceous plant, with a conical root and perennial erect stem; leaves numerous, simple, palmatisected, with pinnatifid lobes; dark green above, pale beneath; inflorescence an indefinite raceme, of dark blue flowers, with the calyx petaloid and galeate, constituting the whole of the outwardly visible floral envelope; the petals being distorted and contained within the helmet-shaped calyx; the fruit apocarpous, consisting of three follicles.

**Collection.**—The leaves and flowering tops are gathered in England when about one-third of the flowers are expanded; while the root is dug up in winter, or early spring, before the leaves have appeared. The great importance of this matter has been proved by experiment, it having been found that while the average yield of a pound of fresh root collected any time *after flowering* is 8 grains, the quantity obtainable from roots collected after the leaves have expanded, but *before flowering*, is considerably less.

**Description.**—Aconite leaves have been already described as being simple and palmatisected with pinnatifid lobes, but, more strictly speaking, the segments of the leaf are distinctly trifid and impressed deeply by veins running right to the top of each lobe without many veinlets.

Aconite root, as found in commerce, is from 2 to 4 inches long, conical in shape, and coffee-coloured externally, but whitish internally. It breaks with a short fracture, and is crowned by the remains of the base of the stem, at which point it is knotty, and is usually from ½ to 1 inch in thickness. When a sound root is broken it is seen to have a pure white meditullium, which is found to be polygonal when examined with a glass.

**Uses.**—Aconitia is a very active poison, causing paralysis of the nerves. There is no dose mentioned in B.P., but 1-400th to 1-50th of a grain may be given by the mouth. When subcutaneously injected the dose should not exceed 1-200th of a grain for an adult.

In the early stages of pneumonia, bronchitis, tonsillitis, and croup, the tincture has proved an effectual remedy.

The antidotes are promptly induced vomiting, followed by stimulants and sinapisms to the spine.

Aconite is used as an anodyne and sedative.

The ointment of Aconitia is a useful agent for the relief of sciatica, neuralgia, and lumbago. Care must be taken that aconite be not rubbed in where the skin is broken, or poisonous symptoms may result from its too rapid absorption.

**Chemistry.**—The active principle of both the root and leaves is an alkaloid called Aconitia (or Aconitina) $C_{30}H_{47}NO_7$, which is combined with an acid known as Aconitic or Equisetic Acid, $H_3C_6H_3O_6$.

The B.P. prescribes the following process for the manufacture of Aconitia in the amorphous form :—

Take of Aconite root in coarse powder, 14 pounds;

rectified spirit, distilled water, diluted sulphuric acid, solution of ammonia, pure ether, of each a sufficiency.

Pour upon the Aconite root three gallons of the spirit, mix them well, and heat until ebullition commences, then cool and macerate for four days. Transfer the whole to a displacement apparatus, and percolate, adding more spirit, when requisite, until the root is exhausted. Distil off the greater part of the spirit from the tincture, and evaporate the remainder over a water-bath until the whole of the alcohol has been dissipated. Mix the residual extract thoroughly with twice its weight of boiling distilled water, and when it has cooled to the temperature of the atmosphere, filter through paper. To the filtered liquid add solution of ammonia in slight excess, and heat them gently over a water-bath. Separate the precipitate on a filter and dry it. Reduce this to coarse powder, and macerate it in successive portions of the pure ether with frequent agitation. Decant the several products, mix, and distil off the ether until the extract is dry. Dissolve the dry extract in warm distilled water acidulated with sulphuric acid; and when the solution is cold, precipitate it by the cautious addition of solution of ammonia diluted with four times its bulk of distilled water. Wash the precipitate on a filter with a small quantity of cold distilled water, and dry it by slight pressure between folds of filtering paper.

In the spirituous extract of the root we have Aconitate of Aconitia, together with resinous matters, which latter are left behind when the alcoholic extract is treated with water. Ammonia is added which combines with the Aconitic acid, and Aconitia is precipitated. Any ammoniacal salt adherent and other impurities are separated by the ether in which they are insoluble. The Aconitia is subsequently converted into soluble sulphate of Aconitia by means of the diluted sulphuric acid; and, lastly, the sulphate is decomposed by ammonium hydrate, the alkaloid being precipitated, whilst ammonium sulphate is left in solution. By this process we can obtain about 35·5 grains of Aconitia from 1 lb. of dried Aconite root.

**Characters and Tests.**—A white, usually amorphous solid, soluble in 150 parts of cold, and 50 parts of hot water, and much more soluble in alcohol and in ether; strongly alkaline to reddened litmus, neutralising acids, and precipitated from them by the caustic alkalies, but not by ammonium carbonate, or the sodium or potassium bicarbonates. It melts with heat, and burns with a smoky flame, leaving no residue when burned with free access of air. When rubbed on the skin it causes a tingling sensation, followed by prolonged numbness.

Aconitia communicates a very characteristic violet tint to syrupy phosphoric acid.

Besides the official alkaloid above mentioned, Aconitia has been obtained in a crystalline state. It is then described as having the formula $C_{54}H_{40}NO_2$ and as being nearly insoluble in water, but freely soluble in dilute acids, to form crystalline salts, especially the nitrate. Its best solvent is stated to be chloroform. Alkaloids, called Napelline, Aconella, and others, have been from time to time described, but their existence in the official root is very questionable.

### Extractum Aconiti.

The expressed juice of the fresh leaves and flowering tops of Aconite evaporated to an extract.

(100 lbs. of plant yield 50 lbs. of juice or 7 lbs. of extract.)

DOSE—1 to 2 grains.

**Linimentum Aconiti.** (1 in 1)

| | | |
|---|---|---|
| Aconite Root, in coarse powder | | 20 ounces |
| Camphor | | 1 ounce |
| Rectified Spirit | ad. | 20 fluid ounces |

Moisten the root with spirit for 3 days, then percolate.

**Tinctura Aconiti.** (1 in 8)

| | | |
|---|---|---|
| Aconite Root, in coarse powder | | 2½ ounces |
| Rectified Spirit | ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

Dose—5 to 15 minims (1 grain of Aconite in 9 minims.)

**Unguentum Aconitiæ.**

| | |
|---|---|
| Aconitia | 8 grains |

Dissolve in 30 minims of Rectified Spirit and rub up with 1 ounce of Prepared Lard.

"**Fleming's Tincture,**" which is sometimes prescribed, is nearly four times stronger than the tincture of the B.P.

**Adulterations and Substitutions.**—Most species of Aconite contain Aconitia. The following is the order of the plants according to their virulency:—A. ferox, A. Napellus, A. neomontanum, A. Cammarum, A. paniculatum. It has been stated that A. heterophyllum (*Atis*), an Indian species, possesses tonic properties, and is not poisonous.

The root being collected in the mountainous parts of Europe by peasants occupied in pasturing sheep and cattle, it is not surprising that it should often be dug up without due regard to the proper season or even the proper species.

ACONITI RADIX INDICA, Indian Aconite, *Bish* or *Bikh.*—The dried root of *Aconitum ferox*, imported from India (Nepal).

**Botanical Source.**—The *Aconitum ferox* grows in the lower parts of the Himalayas. The leaf is somewhat broader in the segments than that of *A. Napellus*, and decidedly more symmetrical in shape. The flowers are also larger and of a very dull blue.

**Collection.**—The roots were formerly collected very much at random, and other species of aconite were often mixed with the *ferox* root, but this is now somewhat improved, and the recent importations are fairly uniform. They are dried by fire-heat.

**Description.**—Elongated and slightly conical, 3 to 4 inches long by 1 to 1½ inches in diameter at the stem end, which latter has not so well marked remains of the stem, owing to close cutting; brownish externally, but having patches where the brown colour has been rubbed off and the white interior shows. Generally, the lower ends of the roots have been cut off in digging, and they therefore exhibit a horny whitish fracture at the narrow end.

**Uses.**—Imported solely for the manufacture of *Aconitia.*

**Chemistry.**—The active principle is supposed to be *Pseud-aconitine*, an alkaloid existing, both crystalline and amorphous, only slightly soluble in cold ether or rectified spirit, and when boiled in water it fuses and becomes sticky, thus differing in these points from ordinary Aconitine.

**PODOPHYLLI RADIX, Podophyllum Root.**—The dried rhizome and rootlets of *Podophyllum peltatum* imported from North America.

**Botanical Source.**—*Podophyllum peltatum (May apple, or Mandrake)* is an herbaceous plant with a creeping horizontal rhizome. The leaves are peltate and sub-divided into 5 or 7 wedged-shaped lobes—inflorescence solitary, terminal consisting of a white flower having a caducous calyx.*

**Description.**—The rhizome is reddish brown to greyish brown in colour, somewhat flattened and marked by knotty joints, which each indicate one year's growth. These nodes are surmounted by a depressed scar where the stem has fallen off, and have either rootlets or small whitish marks where they have broken off. As a rule, the portion between the nodes is smooth, but sometimes deeply furrowed in a longitudinal direction.

**Uses.**—Powerfully cathartic, acting rapidly upon the liver and producing bilious evacuations. It is rarely given *per se*, but nearly always with some other purgative. From the similarity of its action to that of calomel, it has been called the "vegetable mercury."

The powdered rhizome is seldom given in England, but the dose is 10 to 20 grains. The dose of the resin is from ¼ to 1 grain. Care should be taken in its administration, as its action is very variable.

---

NOTE.—*This plant may be looked upon as a connecting link between the Ranunculaceæ and Berberidaceæ, and is by many botanists placed in the latter order.*

**Chemistry.**—The active principle is a resinous matter, of which the dried root yields from 3 to 5 per cent., extracted by alcohol, and official in the B.P. as Podophylli Resina. It also contains, in considerable quantities, a crystalline alkaloid, called Berberine, an odoriferous principle, which may be obtained by sublimation in colourless scales, and saponin.

*Preparation of Resin of Podophyllum.*—Exhaust 1 pound of Podophyllum with 3 pints, or a sufficiency of rectified spirit, by percolation; place the tincture in a still, and draw off the greater part of the spirit. Slowly pour the liquid which remains after the distillation into three times its volume of water, acidulated with 1-24th of its bulk of hydrochloric acid, constantly stirring. Allow the mixture to stand for 24 hours to deposit the resin. Wash the resin on a filter with distilled water and dry it on a stove.

The rectified spirit dissolves the whole of the active resin along with some of the Berberine colouring matter. The acidulated water is to facilitate the separation of the resin, as it settles down very slowly if precipitated by cold water only, and if thrown down by hot water it fuses into a brown cake. The washing with water removes the greater part of the Berberine. The resin should not be dried at a temperature above 90° F., otherwise it will become very dark in colour.

**HELLEBORI RADIX NIGRI, Black Hellebore Root,** *Radix Melampodii.*—The dried rhizome and rootlets of *Helleborus niger*, from Southern and Eastern Europe, cultivated in Britain.

**Botanical Source.**—The *Helleborus niger* (or *Christmas Rose*) is a herb with an almost black rhizome. The leaves are pedate with five ovate lanceolate divisions. Flowers situated on a scape and having a petaloid persistent calyx, with a few large oval bracts. The petals are abortive, forming a circle of short tubular glands, called, by old botanists, nectaries. The plant flowers at Christmas, and bears an apocarpous fruit of several follicles.

**Description.**—The dried rhizome is very dark in colour, rough, knotty, and irregular in form, and the rootlets are usually more or less broken away. It is in pieces from 1½ to 3 inches long by 3-10ths of an inch thick, and whitish internally. When cut it exhibits a meditullium, which is distinctly circular and only slightly stellate in very old samples.

It must carefully be distinguished from *Actæa spicata*, which has a much larger rhizome with a red tinge outside, and a cruciform or triangular meditullium; while true Hellebore has a slightly stellate one, and possesses no red tinge. As Actæa contains tannin, an aqueous infusion is blackened by ferric salts; which is not the case with an infusion of Black Hellebore.

**Uses.**—Drastic and emmenagogue (*ἐμμήνια* the menstrual discharge, and *ἀγωγός* evoking) used in dropsy, nervous diseases, and chronic skin affections. Dose—10 to 20 grains. Formerly official in the Pharm. Lond.

**Chemistry.**—Its action depends on a glucoside, Helleborin (0·05 per cent.) $C_{36}H_{42}O_6$. It also contains another glucoside, Helleborein ($C_{26}H_{44}O_{15}$), which is said to be inert. Helleborin is soluble in water and alcohol, and crystallises in shining colourless needles. When boiled with a dilute acid it forms glucose and Helleboresin, $C_{30}H_{38}O_4$; whilst Helleborein yields Helleboretin, $C_{14}H_{20}O_3$, and glucose.

**STAPHISAGRIÆ SEMINA, Stavesacre Seeds.** The ripe seeds of *Delphinium Staphisagria*, imported from Germany and the South of France.

**Botanical Source.**—The *Delphinium Staphisagria* is a biennial herb much resembling Aconite in the shape of its leaves, but differing in being slightly pubescent, while Aconite is purely glabrous. The inflorescence is a raceme of blue flowers in which the petaloid and *calcarate calyx* forms a ready means of distinction from the galeate flowers of Aconite. The fruit is a bunch of follicles.

**Collection.**—The fruits are collected when ripe, just before they dehisce, and the seeds removed and dried.

**Description.**—About ¼ of an inch in length, and in the form of a 4-sided pyramid ***with one side much larger than the others and slightly rounded.*** The testa is earthy-coloured, wrinkled, and deeply pitted. The seeds are fairly uniform in size, 10 usually weighing about 6 grains.

**Uses.**—The fatty oil of the seeds, extracted by means of ether, has been strongly recommended as an ointment, combined with lard (1 to 7) in *prurigo senilis*.

Stavesacre has been sometimes administered as an anthelmintic (*ἀντὶ* against, and *ἕλμινς* a worm), but is not a safe remedy for internal use, and is almost entirely used in the form of ointment in cases of itch and to destroy *pediculi*.

**Chemistry.**—The active principles are two alkaloids, *Delphinia* $C_{24}H_{35}NO_2$ and *Staphisagrine* $C_{16}H_{23}NO_2$. The seeds also contain about 25 per cent of fixed oil.

The alkaloids may be obtained by treating an alcoholic extract with boiling water acidulated with sulphuric acid, and precipitating from this solution by means of ammonium hydrate. They may be separated from each other by treating with ether.

## ACTÆÆ RACEMOSÆ RADIX, or CIMIFUGÆ RADIX, Cimicifuga Root;

*Black Snake Root, Black Cohosh, Bugbane.*—The dried rhizome and rootlets of *Actæa racemosa*, a native of North America.

**Botanical Source.**—A perennial herb very much resembling the *Actæa spicata* of Northern England. The leaves are inclined to be biternate with a deeply serrate margin, and the inflorescence is a long raceme of whitish flowers. The fruit is a dry follicle (*Actæa spicata* bearing a baccate fruit).

**Description.**—Dark brown short knotty rhizomes about ½ an inch thick and 1 to 3 inches long. They have on one side the remains of stems, and on the other numerous wiry roots, which, in many cases, have their fibrils attached. The roots, when broken, exhibit a very characteristic cruciform or stellate meditullium.

**Uses.**—Stimulant expectorant, but its chief use is in rheumatism, and as an external application in cases of inflammation.

**Chemistry.**—The active portion is a resinous principle called *Cimicifugin* or Macrotin, prepared exactly like *Resina Podophylli.* It is sold in America in brown scales or powder, and the root yields about 3¾ per cent.

**Preparations.**—It is official in the United States' Pharmacopœia, and is given in doses of 20 to 30 grains.

There is also a fluid extract (strength 1 in 1), and a tincture (strength 1 in 8 proof spirit).

HYDRASTIS RADIX, *Yellow Root.*—The dried rhizome and rootlets of *Hydrastis Canadensis* from America.

**Description.**—This root is official in the United States' Pharmacopœia, and is easily known by its yellow colour, tortuous nature, and fine rootlets.

**Uses.**—Considered as tonic and anti-periodic, and may be given in a tincture (1 in 4 rectified spirit); dose ½ to 1 drachm.

**Chemistry.**—Its active principle is obtained in very bitter white crystals, strongly alkaline, and is called *hydrastin.* It is nearly insoluble in water, but freely soluble in alcohol, ether, and chloroform.

## NATURAL ORDER.—MAGNOLIACEÆ.

Trees or shrubs; leaves alternate and stipulate; stipules sheathing the leaf bud and deciduous; calyx

3—6 deciduous sepals; corolla with a ternary arrangement and imbricate æstivation; stamens numerous and hypogynous; pistil apocarpous.

WINTERI CORTEX *vel.* CORTEX WINTERANUS; *Winter's Bark.*—The dried bark of *Drimys Winteri*, from the Straits of Magellan and the southern parts of South America generally.

**Botanical Source.**—The true *Drimys* is an evergreen tree growing from 10 to 40 feet in height.

**Description.**—A very thick bark in short quills or channelled pieces, often twisted or bent backwards. Ashy grey to brownish externally, and rusty brown internally. The inner side is characterised by sharp striæ or longitudinal ridges with some minute cracks, as if the inner bark had contracted to a great extent in drying. These ridges are seen at the fracture to be the broken ends of white liber tissue. This radiating white liber serves to perfectly distinguish its bark from that of *Canella alba.*

**Uses.**—Stimulating, tonic and anti-scorbutic. Used in South America for chronic gastric affections and diarrhœa.

**Chemistry.**—It contains tannic acid or some nearly allied bodies; essential oil and resinous matter. Its decoction, on treatment with potash, becomes dark violet; but is *not* turned intensely bluish brown by tincture of iodine.

**Substitutions.**—The bark of *Cinnamodendron corticosum*, which has been imported as Winter's Bark and mixed with *Canella alba.* This bark is very like *Canella* but darker in colour, and the inner surface is more fibrous. A decoction is turned intensely purple brown by iodine (distinction from *Drimys*), and is also blackened by ferric chloride (distinction from *Canella*).

## ANISI STELLATI FRUCTUS, Star Anise Fruit.

—The dried fruit of *Illicium anisatum*, imported from China.

**Botanical Source.**—The *Illicium* is a small tree about 20 feet high, and a native of China, but cultivated also in Japan.

**Description.**—The fruits are extremely easy to recognise, consisting, when perfect, of 8 one-seeded carpels arranged round a central attachment like a star. The carpels are partially dehisced by the ventral suture showing the brightly polished seed. The odour of aniseed is exceedingly strong.

**Uses.**—As a substitute for true Aniseed in making liqueurs.

**Chemistry.**—The carpels contain from 4 to 5 per cent. of a volatile oil corresponding in composition to oil of aniseed, and which solidifies below 36° F. The seeds are destitute of aromatic properties, but contain a fixed oil.

## NATURAL ORDER.—MENISPERMACEÆ.

Climbing or trailing shrubs; leaves alternate and exstipulate; flowers diœcious, having a tendency to ternary arrangement in all their parts; fruits with a solitary and peculiarly curved seed.

**CALUMBÆ RADIX.**—The transversely sliced and dried root of *Jateorhiza palmata*, from the forests of Eastern Africa between the Ibo and Zambesi rivers.

**Botanical Source.**—The *Jateorhiza palmata* is a perennial climbing plant with palmate leaves and diœcious flowers, which was called *Cocculus palmatus* by old writers. It has been also named *Jateorhiza Calumba* and *J. Miersii*, but the distinctions of these varieties have now been sunk in the one species of *palmata* which includes all.

**Collection.**—The roots are dug up in March, sliced and then dried in the shade.

**Description.**—In flat circular or oval slices varying much in diameter, but never more than ¼ an inch thick. The cortical portion is thick and hard, while the meditullium is thin by contraction during drying. The colour is a dull greenish yellow, and the odour peculiarly musty.

**Uses.**—Calumba is an aromatic bitter and demulcent tonic, with an entire absence of astringency, and consequently devoid of constipating properties. It is given in cases of indigestion, nausea, and flatulence, usually combined with alkalies or iron preparations.

**Chemistry.**—Calumbin $C_{21}H_{22}O_7$ is the principal constituent, but it also contains calumbic acid $C_{22}H_{24}O_7$, berberia ($C_{20}H_{17}NO_4$), resinous extract, a trace of volatile oil, and a large quantity of starch.

Berberia must not be confounded with beberia the alkaloid from the Beeberu.

Calumbin is a neutral body having a yellow colour, slightly soluble in water, alcohol, and ether, but freely soluble in alkalies. Calumba does not contain any tannic or gallic acids.

### Extractum Calumbæ.

(1 from 8 made with cold water.)

DOSE—2 to 10 grains.

### Infusum Calumbæ.

| | |
|---|---|
| Calumba Root ........................ | ½ ounce |
| *Cold* distilled water.................... | 10 fluid ounces |

Macerate 1 hour, and strain.

*Incompatibles*—Lead, mercury, or Aq. Calcis.

DOSE—1 to 2 fluid ounces.

Cold water is used to avoid dissolving out the starch of the root.

### Mistura Ferri Aromatica. "Heberden's Ink."

½ ounce Calumba to 16 fluid ounces—Peppermint water, with iron and other ingredients.

**Tinctura Calumbæ.**

| | | |
|---|---|---|
| Calumba Root, cut small | | 2½ ounces |
| Proof spirit | ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

DOSE—½ to 2 drachms (7 grains of Calumba in 1 fluid drachm).

## PAREIRÆ RADIX, Pareira Root.—

The dried root of *Chondodendron tomentosum*, imported from Brazil.

**Botanical Source.**—The true *Chondodendron* is a tall climbing shrub with leaves 12 inches long, and unisexual flowers. It was formerly supposed that the source of the Pareira Root was the *Cissampelos Pareira*, but Hanbury has conclusively proved that this latter plant, although sometimes used medicinally in the West Indies, is never exported.

**Description.**—According to Hanbury, the true drug is a long branching woody root, attaining 2 inches or more in diameter, but usually met with much smaller, and dividing into rootlets no thicker than a quill or even than a horse-hair. It is remarkably tortuous and marked with transverse ridges as well as with constrictions and cracks more or less conspicuous; besides which the surface is strongly wrinkled longitudinally. Roots of about 1 inch in diameter, cut transversely, exhibit a central column of ·2 to ·4 inch in diameter composed of 10 to 20 converging wedges of large-pored woody tissue with 3 or 4 zones divided from each other by a wavy light-coloured line. Crossing these zones are wedge-shaped rays irregularly and sparsely distributed. It is inodorous, but bitter to the taste, and its decoction is turned inky by tincture of iodine.

**Uses.**—Possesses a tonic influence on the passages of the genito-urinary system, and is found useful in chronic gonorrhœa and cystitis.

**Chemistry.**—It contains a bitter principle called *Pelosin*, of which it yields about 4½ per cent. Pelosin has the formula of $C_{18}H_{21}NO_3$, is insoluble in water, but soluble in alcohol and ether, and forms bitter salts with acids.

**Decoctum Pareiræ.**

| | |
|---|---|
| Sliced Pareira Root.................... | 1¼ ounce |
| Water, *distilled* ...................... | 1 pint |

Boil for 15 minutes and strain.

DOSE—1 to 2 ounces.

Brodie's decoction was ½ an ounce to 3 pints of distilled water boiled down to 1 pint.

Dose—8 to 12 ounces daily.

### Extractum Pareiræ.

| | |
|---|---|
| Pareira Root, in coarse powder ........ | 16 ounces |
| Boiling Distilled Water ................ | 1 gallon |

(100 lbs. of root yield about 6 lbs. of extract.)

Dose—10 to 20 grains.

### Extractum Pareiræ Liquidum.

| | |
|---|---|
| Pareira Root, in coarse powder ........ | 16 ounces |
| Boiling Distilled Water ................ | 1 gallon |
| Rectified Spirit ...................... | 3 fluid ounces |

Product, 16 fluid ounces.

Dose—½ to 2 drachms. 1 fluid drachm is equal to 1 drachm of root or 4 grains of solid extract.

**Substitutions.**—*Common false Pareira Brava.* This is what has been for many years the ordinary Pareira of the shops, and until lately regarded as *Cissampelos Pareira.* Its origin is uncertain, but it belongs to the Menispermaceæ. It consists of pieces varying from 6 to 12 inches or more in length, and 1 to 4 inches thick. It is heavy and tortuous, and is derived from both stem and root. In the pieces of the STEM *the pith is well defined and about ¼ of an inch in diameter,* and surrounded by many concentric, or sometimes eccentric rings. In the ROOT *the pith is absent,* and the rings are very eccentric. It is tough and fibrous, and its decoction is not tinged blue by iodine.

*Chondodendron tomentosum stems.* Pieces of a large and knotty stem from 1 to 4 inches thick. The thicker pieces exhibit a few *concentric* woody zones, and are frequently hollowed by age. The thinner pieces are dotted over with small dark warts.

*True Cissampelos Pareira.* This is chiefly found in stems varying in size, but never reaching 1 inch in diameter. The fracture is coarse and fibrous, and there are *no concentric rings.*

Besides these the stems and roots of *Abuta rufescens* have been imported as *white pareira,* and those of the *Abuta amara* as yellow pareira.

## COCCULUS INDICUS, Levant Nut.—

The dried fruits of *Anamirta Cocculus,* imported from Malabar *via* Bombay and Madras.

**Botanical Source.**—The *Anamirta* is a climbing shrub with unisexual flowers producing 1 to 3 purple *drupes,* which when dried have the appearance of small berries.

**Description.**—Blackish and slightly reniform hard fruits about 4-10ths of an inch long. They are wrinkled on the surface, and when shaken close to the ear are found not to have the seed loose in the pericarp, thus distinguishing them from Bay berries.

**Uses.**—Said to be used chiefly by tanners, but it is currently supposed to be secretly employed by unprincipled persons in brewing, and in poisoning fish. More direct information is wanting. It is not used in medicine and is actively poisonous, producing giddiness and tetanic convulsions.

**Chemistry.**—It owes its action to about 2-5ths to 1 per cent. of Picrotoxin $C_5H_6O_2$, which resides in the seed. It is a colourless neutral substance, probably a glucoside, and is soluble in 150 parts of cold water, 25 parts of boiling water; in 2 parts of ether, and 3 parts of alcohol.

Picrotoxin may be obtained by separating the oil (50 per cent.) from the kernels by expression, exhausting them with rectified spirit, distilling off the spirit, shaking the residue with boiling water acidulated with hydrochloric acid, evaporating and crystallising.

The aqueous solution of *Picrotoxin* may be distinguished from the bitter poisonous alkaloids by not giving a precipitate with any metallic salt or any of the usual re-agents for alkaloids. It, however, somewhat colours potassium dichromate and sulphuric acid, and must, therefore, not be mistaken for strychnia.

Two crystallisable, tasteless, non-poisonous substances, having the same composition, and termed respectively Menispermin and Paramenispermin, are said to have been obtained from the pericarp, but they require re-examination.

GULANCHA.—The dried stems and adventitious roots of *Tinospora cordifolia*, from tropical regions in India.

The drug is in the Pharmacopœia of India, and is considered as tonic, anti-periodic, and diuretic. No proper chemical research has ever been made on it.

## NATURAL ORDER.—BERBERIDACEÆ.

Frequently shrubs with alternate compound, and usually spiny leaves and regular symmetrical flowers; calyx 3, 4, or 6 sepals in two whorls, deciduous; petals of corolla equal to sepals and opposite to them; stamens equal to petals and opposite to them, hypogynous; anthers two-celled, dehiscing valvularly; pistil simple.

There are no plants of this order official in Britain, but the bark of the *Berberis vulgaris*, or common barberry, has been used to adulterate Cortex Granati.

In the Indian Pharmacopœia we find the root bark of *B. Asiatica*, which is tonic and anti-periodic. An extract is also made from it and sold as *Rusot*, for affections of the eye.

In America, the herbalists use the rhizome of *Caulophyllum thalictroides*, under the name of Blue Cohosh, for uterine diseases, and that of *Jeffersonia diphylla* (a root resembling Senega) for rheumatism.

## NATURAL ORDER.—PAPAVERACEÆ.

Usually herbs with a milky juice; leaves alternate and exstipulate; sepals 2, caducous; petals 4, crumpled in æstivation; stamens indefinite, hypogynous; anthers innate; pistil syncarpous, with 2 or more parietal placentæ; seeds numerous and albuminous.

**RHŒADOS PETALA.**—The fresh petals of the *Papaver Rhœas* from indigenous plants.

**Botanical Source.**—The *Papaver Rhœas* (red or corn poppy) is a small hairy herb with pinnatisected leaves. The calyx is *caducous*, *i.e.*, falls off when the bud expands, and the corolla is bright scarlet in colour.

**Collection.**—The petals should be collected in June and July, and used while fresh for making *Syrupus Rhœados*.

**Uses.**—Only as a colouring matter in the form of *Syrupus Rhœados*. No Morphia appears to be present.

**Chemistry.**—The petals contain 12 per cent. yellow fatty matter, 20 of gum, 28 of lignin and 40 of red colouring matter. This latter is soluble in water and alcohol, but insoluble in ether. Its watery solution is turned dirty violet by ferric salts, and blackish by caustic potash.

A slightly alkaline substance called Rhœadin, $C_{21}H_{21}NO_6$, has been isolated from this plant. It is crystalline and colourless and only soluble in acids. By exposing its solution in acid to the air it becomes bright scarlet. This colour is bleached by alkalies, but restored by acids.

**Syrupus Rhœados.**

| | |
|---|---|
| Red Poppy Petals ...................... | 13 ounces |
| Refined Sugar ........................... | 36 ounces |
| Distilled Water.....................q.s. or | 20 fluid ounces |
| Rectified Spirit.......................... | 2½ fluid ounces |

Product, 58 ounces by weight, or 43½ fluid ounces by measure; S.G. 1·330.

**PAPAVERIS CAPSULÆ, Poppy Heads.**—The dried nearly ripe capsules of *Papaver somniferum*, cultivated in Britain.

**Botanical Sources.**—(1.) The *Papaver somniferum* (var. *album*) is an annual herb from 2 to 4 feet high. Leaves large, sessile, amplexicaul, deeply sinuate, dentate in the margin. Flowers white with a dark spot near the bottom. Capsules *ovate in shape* with a stellate sessile stigma and *indehiscent.* The seeds are light coloured.

(2.) The *Papaver somniferum* (var. *nigrum*) is altogether smaller and more glaucous. The petals are red or violet. The capsule is *globose* in shape and *dehiscent by pores* under the sessile stigma. The seeds are blackish.

(3.) The *P. somniferum* (var. *setigerum*) is the true wild opium poppy, having somewhat acutely lobed leaves, the teeth sharp and terminating in a bristle; indeed the whole plant is more or less covered with scattered sharp stiff hairs. This variety is never seen in England.

**Collection.**—The capsules should be collected when still slightly unripe, because it is found that any little trace of morphia, which may exist in English grown poppies, entirely disappears on their attaining ripeness.

**Uses.**—Slightly hypnotic, but very variable in strength and consequently not reliable.

**Chemistry.**—Similar to Opium, but in a very much lower degree of completeness and richness.

**Decoctum Papaveris.**

| | |
|---|---|
| Poppy Capsules, bruised .............. | 2 ounces |
| Distilled Water ...................... | 1½ pint |

Boil 10 minutes; product 20 fluid ounces.

**Extractum Papaveris.**

| | |
|---|---|
| Poppy Capsules, freed from the seeds.... | 16 ounces |
| Rectified Spirit........................ | 2 fluid ounces |
| Boiling Distilled Water ................ | q.s. |

DOSE—2 to 5 grains.

**Syrupus Papaveris.**

| | |
|---|---|
| Poppy Capsules, bruised and freed from seeds | 36 ounces |
| Boiling Distilled Water | 2½ gallons |
| Rectified Spirit | 16 fluid ounces |
| Refined Sugar | 64 ounces |

Product, 104 ounces by weight, or 78¾ fluid ounces by measure; S.G. 1·320.

Dose—1 drachm.

PAPAVERIS SEMINA, Maw Seed.—The seeds of the Poppy, from which a fixed oil is expressed which has drying properties like linseed oil.

OPIUM.—The inspissated juice (obtained by incisions and subsequent spontaneous evaporation) from the unripe fruit of *Papaver somniferum*, grown in Asia Minor.

**Botanical Source.**—Has been already described. (See *Papaveris Capsulæ.*)

**Collection.**—The collection of opium chiefly takes place in Asia Minor, Persia, India, and Egypt. The incisions are made transversely with a knife into the skin of the capsule a few days after the fall of the petals, when the fruit is about 1½ inch in diameter. Great care is taken that the incision does not penetrate the skin entirely, as then the juice would flow into the interior of the fruit and be lost. The juice oozes out from the cut and is scraped off. When enough has been thus obtained it is made into a lump or cake, covered with a leaf, and put to dry in the shade.

**Uses.**—Opium arrests the secretions generally except perspiration, which it assists. In large doses it produces irresistible tendency to sleep and insensibility to pain. In many persons the recovery from a full dose of opium is attended with nausea, headache, giddiness, and constipation. It is employed in inflammatory diseases; in fevers, when it is desired to allay delirium; in diarrhœa, and generally as an anodyne to diminish and relieve the spasms of pain in acute organic disease. Its applications are extremely various, and it is one of the most valuable medicines we possess in the hands of a judicious practitioner.

**Antidotes.**—Emetics and the stomach pump, coupled with continual rousing of the patient, and affusion of cold water on the head and chest.

The dose of opium in powder is ¼ to 2 grains, but 1 grain is always looked upon as the medium adult dose.

## Description of Commercial Varieties.

**Smyrna Opium.**—The highest quality in the market. It is in masses of from ½ to 2 lbs. weight and covered externally with poppy leaves, and the red fruits of a species of *Rumex*. It is pale brownish internally, and when examined under the microscope it is found to be a mass of agglutinated tears of a yellowish colour. It yields on an average about 12 per cent. of *Morphiæ hydrochloras*, when treated by the B.P. process. Good opium blackens externally, hardens, and loses weight by exposure.

**Constantinople Opium.**—Practically the same as the Smyrna, only imported *via* Constantinople. It is produced in the north-western districts of Asia Minor, and sent to Constantinople by way of Izmid. It is similar to the Smyrna, although usually more symmetrical in the cakes, and not quite so regular in quality. It is equally good for official use with the Smyrna, and yields at least 8 per cent. of morphia and 4 of narcotine. It would also give about 12 per cent. of the hydrochlorate of morphia by the B.P. process. The cakes are usually wrapped in a poppy leaf, with a very evident midrib running up the middle of the cake.

**Egyptian Opium.**—An inferior variety, now not often met with in commerce. It is in flattish hard cakes, covered with a leaf having a somewhat *palmate* structure and no *Rumex* fruits. It has a musty smell and does not blacken by keeping, but becomes soft. It rarely yields over 6 per cent. of morphia, but usually the amount is more nearly 3 to 4 per cent.

**Persian Opium.**—In balls or sticks, usually wrapped in paper. It formerly went almost entirely to China, but lately a good deal has been brought to this country for morphia manufacture. It is very variable, as fine samples have been met with yielding 8 to 10 per cent. of morphia, working on the *undried* article, while other pale samples have only yielded ½ to 3 per cent.

**East Indian Opium.**—Is produced in large quantities in the Government factories in India, and is entirely exported to China, none ever coming to us. The finest variety is known as the *Patna garden opium*, and yields 7 to 8 per cent. of morphia. As exported to China it is called *cannon ball* opium, from being formed into balls and covered with poppy petals, caused to adhere by a liquid called *léwá*, which is made from the washing of pots and vessels and a little opium, and then evaporated to a sticky fluid.

**B.P. test for the strength of Opium.**—Breakdown 100 grains and steep in one ounce of water for 24 hours, stirring the mixture frequently. Transfer to a displacement apparatus and exhaust by percolation with three ounces more of water. To the fluid thus obtained, placed in a flask, add 100 grains of slaked lime to precipitate the meconic acid and liberate the morphia; boil for ten minutes, transfer it to a filter and wash the undissolved matter with 1 ounce of boiling water. Acidulate the filtered fluid slightly with diluted hydrochloric acid, evaporate to half an ounce, and let it cool. Neutralise cautiously with solution of ammonia, carefully avoiding an excess; remove by filtration the brown matter which separates and wash it with 1 ounce of hot water. Mix the washings with the filtrate, concentrate the whole to half an ounce, and add ammonia in slight excess. After 24 hours, collect the precipitate on a weighed filter, wash it with cold water, and dry at 212° F. It ought to weigh at least from 6 to 8 grains.

In addition to this official process several others have been proposed, but none without a drawback of some kind. The following is good, if carefully performed:—Take 100 grains of opium, previously dried at 212° F., rub it intimately with three times its weight of coarsely powdered pumice-stone, and percolate with boiling ether to remove narcotine, colouring matter, and wax. Just moisten with a little spirit and then extract with water slightly acidulated with acetic acid. The amount of water employed should not, if possible, exceed 5 ounces. Ammonia is now added in the slightest possible excess, and the whole set aside for 48 hours, when the morphia will be deposited in crystals on the sides of the glass. The mother liquor is to be poured away, the morphia purified by re-crystallisation from boiling alcohol, and the crystals dried and weighed.

In addition to the assay for morphia, the amount of water should always be determined in a sample of opium by taking a weighed portion of thin slices and drying over the water-bath until it ceases to lose weight. Besides these points, the dried opium should be exhausted with cold water, and the residue collected on a weighed filter and again dried at 212° F. The amount of this residue should not exceed 45 per cent. The addition of gum arabic may be detected by precipitating a solution of opium with normal plumbic acetate, concentrating the filtrate to a low bulk and precipitating out the gum arabic with alcohol. Genuine opium should contain no starch or tannic acid. Lastly, a portion of opium dried at 212° F. should be weighed and freely incinerated, when the amount of ash left should not exceed 8 per cent.

**Chemistry.**—Opium contains the following principal primary alkaloids:—

Morphia (Morphine)—$C_{17}H_{19}NO_3 \cdot H_2O$ (6 to 12 per cent.)
Codeia (Codeine)—$C_{18}H_{21}NO_3$
Thebaia (Thebaine)—$C_{19}H_{21}NO_3$
Narceia (Narceine)—$C_{23}H_{29}NO_9$
Papaverine—$C_{21}H^{21}NO_4$
under 1 per cent.
Narcotia (Narcotine) (Anarcotine)—$C_{22}H_{23}NO_7$ (6 to 8 per cent.)

It also contains:—

Meconic Acid—$H_3C_7HO_7 \cdot 3H_2O$ (about 8 per cent.)
Meconine—$C_{10}H_{10}O_4$
Rhœadine—$C_{21}H_{21}NO_6$
Traces.
Resinous Matters
Caoutchouc
Essential Oil
Mucilage
Variable.

Besides these there are also numberless secondary constituents, *i.e.*, substances produced from opium by the action of re-agents often during the processes applied for separating the natural constituents. The following are the principal:—

Apomorphia (Apomorphine)—$C_{17}H_{17}NO_2$
Apocodeia (Apocodeine)—$C_{18}H_{19}NO_2$
Cryptopia—$C_{21}H_{23}NO_5$

MORPHIA (Morphine), $C_{17}H_{19}NO_3H_2O$, may be prepared according to the B.P., by macerating one pound of sliced opium for 24 hours with two pints of water and decanting. Repeat this process with the residue a second and third time and finally subject the residue to strong pressure. Evaporate the united liquors in a water-bath to a pint and strain through calico. Add three-quarters of an ounce of calcium chloride, dissolve in four fluid ounces of water and evaporate until the solution solidifies on cooling. Wrap the mass in a double fold of strong calico, and subject it to a powerful pressure, preserving the dark fluid which exudes, as it frequently still contains some morphia. Triturate the squeezed cake with about half a pint of boiling water, filter and wash the residue with boiling distilled water. Evaporate the filtrate until it again solidifies on cooling and subject it to pressure as before, and if the mass be still coloured mix it in boiling water, again evaporate to solidification, and subject it to pressure as before, always preserving the liquid which exudes. Dissolve the pressed cake in six fluid ounces of boiling water, add a quarter of an ounce of purified animal charcoal and digest for 20 minutes; filter and wash the residual charcoal with boiling water and add to the solution ammonium hydrate in slight excess. Collect the morphia which separates as the liquid cools on a filter, and wash with cold water until the washing ceases to give a precipitate with a solution of Argentic nitrate, acidulated with nitric acid.

In this process the water extracts from the opium, the morphia and codeia as meconates together with extractive matter, the narcotine remaining undissolved. On adding calcium chloride and evaporating, a cake is obtained containing calcium meconate and the hydrochlorates of morphia and codeia, while the extractive matters are removed in the liquid which exudes by pressure. On treating the cake with boiling water the calcium meconate remains insoluble and the hydrochlorates of morphia and codeia dissolve. This process is repeated until they are obtained nearly pure. The solution containing the hydro-chlorates of the alkaloids, after further purification by animal charcoal, is treated with ammonium hydrate in slight excess, which precipitates the morphia and re-dissolves the codeia.

*Morphia* crystallises in hexagonal prisms. It has a bitter taste and fuses at 340°. At 350° the alkaloid sublimes and at a higher temperature it chars and burns away. It is very slightly soluble in cold water (1 in 1000) and more so in boiling water (1 in 400), its solutions having an alkaline re-action. It is soluble in 30 parts of boiling rectified spirit and insoluble in chloroform and ether. It is precipitated by potassium and sodium hydrates, instantly soluble in excess. Its best precipitant is sodium bicarbonate. It is also precipitated from its solution by tannic acid.

**Tests.**—(1.) A little solid morphia treated with strong nitric acid produces an orange-red coloration which is bleached by stannous chloride.

(2.) A fresh portion of solid morphia, treated with neutral ferric chloride, gives an evanescent blue colour.

(3.) Mixed with six times its weight of sugar, and a drop of strong sulphuric acid added, a purple colour is produced.

(4.) Dissolved in strong sulphuric acid and a drop of water added, followed by a drop of nitric acid, the liquid is, first red, then green, then brown.

(5) Mixed with iodic acid and starch paste a blue colour is produced, due to the liberation of iodine.

## MORPHIÆ HYDROCHLORAS, B.P.

$C_{17}H_{19}NO_3H\,Cl\,8\,H_2O$,

Is prepared by dissolving morphia in water by the aid of hydrochloric acid until a perfectly neutral solution is obtained, and crystallising. It is found in silky acicular prisms soluble in cold water (1 in 16) and in boiling water (1 in 1); also freely soluble in spirit. Twenty grains dissolved in half an ounce of warm water and precipitated by a slight excess of ammonium hydrate and the precipitate dried by exposure to the air, should yield 15·18 grains of pure morphia. The dose is a half to one grain.

### Liquor Morphiæ Hydrochloratis.

| | |
|---|---|
| Hydrochlorate of Morphia ............ | 4 grains |
| Diluted Hydrochloric Acid ............ | 8 minims |
| Rectified Spirit ...................... | 2 fluid drachms |
| Distilled Water ...................... | 6 fluid drachms |

(½ grain of Hydrochlorate of Morphia in 1 fluid drachm, half the strength of P.L.)

Dose—10 to 60 minims.

### Suppositoria Morphiæ.

| | |
|---|---|
| Hydrochlorate of Morphia ............ | 6 grains |
| Benzoated Lard ...................... | 64 grains |
| White Wax ........................... | 20 grains |
| Oil of Theobroma .................... | 90 grains |

(½ grain of Hydrochlorate of Morphia in each.) Divide into 15 grains for suppositories, or into 12 equal parts.

### Suppositoria Morphiæ cum Sapone.

| | |
|---|---|
| Hydrochlorate of Morphia.............. | 6 grains |
| Glycerin of Starch ................... | 50 grains |
| Curd Soap (in powder) ................ | 100 grains |
| Starch (in powder) ................... | q.s. |

(½ grain of Hydrochlorate of Morphia in each.) Divide the mass into 12 equal parts.

### Trochisci Morphiæ.

| | |
|---|---|
| Hydrochlorate of Morphia ............ | 20 grains |
| Tincture of Tolu...................... | ½ fluid ounce |
| Refined Sugar, in powder .............. | 24 ounces |
| Gum Acacia, in powder................ | 1 ounce |
| Mucilage of Gum Acacia .........q.s. or | 2 fluid ounces |
| Distilled Water ...................... | ½ fluid ounce |

Divide into 720 lozenges.

DOSE—1 to 6. (Each lozenge contains 1-36th grain of Hydrochlorate of Morphia.

### Trochisci Morphiæ et Ipecacuanhæ.

| | |
|---|---|
| Hydrochlorate of Morphia ............ | 20 grains |
| Ipecacuanha, in fine powder............ | 60 grains |
| Tincture of Tolu...................... | ½ fluid ounce |
| Refined Sugar ........................ | 24 ounces |

| | |
|---|---|
| Gum Acacia, in powder ................ | 1 ounce |
| Mucilage of Gum Acacia ........q.s. or | 2 fluid ounces |
| Distilled Water ...................... | ½ fluid ounce |

Divide into 720 lozenges.

Dose—1 to 6. (Each lozenge contains 1-36th grain of Hydrochlorate of Morphia and 1-12th grain of Ipecacuanha.

## MORPHIÆ ACETAS, B.P.

$C_{17}H_{19}NO_3,C_2H_4O_2$,

Is prepared by precipitating the morphia from a solution of hydrochlorate of morphia by means of a very slight excess of ammonium hydrate, washing and dissolving in the exact quantity of acetic acid necessary to produce a neutral salt, and evaporating to dryness in a water-bath. Acetate of Morphia is a slightly deliquescent salt, soluble in water and spirit. When first prepared it is a white powder, but by keeping it becomes yellowish, owing to the formation of basic Acetate. A similar loss of acetic acid is also apt to take place through evaporation, and the composition of the commercial salt is therefore by no means constant.

### Liquor Morphiæ Acetatis.

| | |
|---|---|
| Acetate of Morphia .................. | 4 grains |
| Diluted Acetic Acid .................. | 8 minims |
| Rectified Spirit......................... | 2 fluid drachms |
| Distilled Water ...................... | 6 fluid drachms |

(¼ grain of Acetate of Morphia in 1 fluid drachm, half the strength of P.L.)

Dose—10 to 60 minims.

**Injectio Morphiæ Hypodermica.**

| | |
|---|---|
| Hydrochlorate of Morphia ............ | 88 grains |
| Solution of Ammonia.................. | Of each a sufficiency |
| Acetic Acid ......................... | |
| Distilled Water ..................... | |

(1 grain of Acetate of Morphia in 12 minims.)

Dissolve 88 grains of Hydrochlorate of Morphia in two ounces of water by the aid of a gentle heat, then add solution of ammonia so as to precipitate the Morphia and render the liquid slightly alkaline; allow it to cool; collect the precipitate on a filter, wash it with water, and allow it to drain; then transfer the Morphia to a small porcelain dish containing about an ounce of water: apply a gentle heat, and carefully add acetic acid until the Morphia is dissolved and a very slightly acid solution is formed. Add now sufficient water to make the solution measure exactly two fluid ounces; filter and preserve in a stoppered bottle excluded from the light.

The above process is necessary to ensure a solution of definite strength, owing to the tendency, above mentioned, which Acetate of Morphia has to lose acetic acid. The 88 grains of Hydrochlorate represent 66·79 grains of Morphia, and produce 80 grains of Acetate in the two ounces of solution. Twelve minims of the injection therefore contain one grain of Acetate of Morphia.

The amount to be administered is from one to six minims.

**Apomorphia.** — $C_{17}H_{17}NO_2$ (that is Morphia $C_{17}H_{19}NO_3—H_2O$), is prepared by heating Morphia in a sealed tube with hydrochloric acid for three hours, during which process it loses a molecule of water, and is converted into the Hydrochlorate of Apomorphia. Apomorphia is soluble in water and ether but more so in alcohol and chloroform. It gives a red colour with nitric acid, and purple with ferric chloride. It is precipitated from its salts both by potassium and ammonium hydrates, but readily soluble in excess, the potash solution becoming red, and the ammonia greenish, by exposure.

USES.—When subcutaneously injected it produces violent sickness, followed by *hypnosis*, and sometimes by *syncope*, and may, therefore, be useful when sudden vomiting is desired in cases of poison.

**Codeia** (Codeine), $C_{18}H_{21}NO_3$, may be prepared from the mother liquor after the separation of morphia in the B.P. process, by precipitation with potassium hydrate, and subsequent re-solution, treatment with animal charcoal and crystallisation. It is usually found to the extent of nearly 1 per cent. in opium. It is colourless, bitter, and soluble in water (1 in 50) and in boiling water (1 in 25); it is very soluble in alcohol and chloroform, but requires 40 parts of ether. It gives a dull greenish orange with nitric acid, and is not affected by ferric chloride. It is hypnotic in action, but not so much so as morphia. There is a Syrup of Codeia in the French Pharmacopœia.

**Narceia** (Narceine), $C_{23}H_{20}NO_9$, may be prepared from the liquid remaining after precipitation of Codeia, by removing the colouring matter with acetate of lead, filtering, passing sulphuretted hydrogen through the filtrate to remove lead, and evaporating to a syrup, when it separates in silky crystals. It is soluble in water (1 in 400), and in boiling water (1 in 100); it is less soluble in alcohol, and insoluble in chloroform and ether. It is soluble in glycerin. With dilute hydrochloric acid it is coloured blue. With strong sulphuric acid it becomes first amber and then deep red.

**Meconia** (Meconine), $C_{10}H_{10}O_4$, may be separated from the mother liquor left after the crystallization of

Narceia, by shaking it up with ether. Meconia is soluble in water, glycerin, and chloroform; less so in ether and alcohol. Heated gently with sulphuric acid it becomes first emerald green and then purple.

**Narcotia** (Narcotine, Anarcotine), $C_{22}H_{23}NO_7$, is prepared from the residue left after exhausting the opium with water, by treating with acetic acid, precipitating by ammonium hydrate and purifying by dissolving the precipitate in alcohol, and crystallising. It is in colourless prisms, insoluble in cold water, and slightly soluble in boiling water; soluble in alcohol and in acids, forming bitter salts. It is precipitated by potassium hydrate, insoluble in excess. By treatment with oxidising agents it yields Opianic Acid and Cotarnia. It is destitute of hypnotic influence, and hence the new synonym proposed.

**Thebaia** (Thebaine), $C_{19}H_{21}NO_3$, prepared from the alcoholic mother liquor from the crystals of narcotine, by evaporating to dryness, treating with acetic acid, filtering and precipitating with acetate of lead, which precipitates Papaverine, and leaves Thebaia in solution. The excess of lead is removed by sulphuric acid, and the alkaloid precipitated by ammonium hydrate. In colourless, rectangular prisms, soluble in alcohol, ether, and chloroform; with strong cold sulphuric acid it forms a blood red solution.

**Papaverine**, $C_{21}H_{21}NO_4$, prepared from the lead precipitate above-mentioned by boiling with alcohol, evaporating the solution to dryness, and treating with dilute hydrochloric acid, filtering, and allowing the Hydrochlorate of Papaverine to crystallise. Very slightly soluble in water, soluble in boiling alcohol. Cold sulphuric acid produces no colour, but on heating the solution becomes first purple and afterwards red.

**Meconic Acid**, $H_3C_7HO_7.3H_2O$, may be prepared from calcium meconate formed during the manufacture of morphia, by treating it with hydrochloric acid and crystallising. It is in colourless micaceous crystals; sparingly soluble in cold water, freely in hot. It gives precipitates with salts of calcium, barium, and lead, and a blood red with ferric chloride, not discharged by mercuric chloride.

### Other Opium Preparations:—

**Confectio Opii.**

| | |
|---|---|
| Compound Powder of Opium .......... | 192 grains |
| Syrup ................................ | 1 fluid ounce. |

DOSE—5 to 20 grains (1 grain of opium in 40 grains, nearly).

### Emplastrum Opii.

| | |
|---|---|
| Opium, in very fine powder | 1 ounce. |
| Resin Plaster | 9 ounces. |

1 part of opium in 10 parts.

### Enema Opii.

| | |
|---|---|
| Tincture of Opium | 30 minims |
| Mucilage of Starch | 2 fluid ounces |

Mix for one enema.

### Extractum Opii.

| | |
|---|---|
| Opium, in thin slices | 16 ounces |
| Distilled Water | 6 pints |

(100 lbs. of good Opium yield 50 lbs. of extract.)

DOSE—¼ to 2 grains.

### Extractum Opii Liquidum.

| | |
|---|---|
| Extract of Opium | 1 ounce |
| Distilled Water | 16 fluid ounces |
| Rectified Spirit | 4 fluid ounces |

Product 20 fluid ounces. 1 grain of Extract of Opium in 22 minims.

*Incompatibles*—Most metallic salts: the alkalies, and their carbonates. DOSE—10 to 40 minims.

### Linimentum Opii (*Anodyne Liniment*).

| | |
|---|---|
| Tincture of Opium | 2 fluid ounces |
| Liniment of Soap | 2 fluid ounces |

(1 of Tinct. Opii in 2.)

### Pilula Ipecacuanhæ cum Scillâ.

| | |
|---|---|
| Comp. Powder of Ipecacuanha | 3 ounces |
| Ammoniacum, in powder | 1 ounce |
| Squill, in powder | 1 ounce |
| Treacle | q.s. |

DOSE—5 to 10 grains. (5 grains of Dover's powder in about 10 grains.)

### Pilula Plumbi cum Opio.

| | |
|---|---|
| Acetate of Lead, in fine powder | 36 grains |
| Powdered Opium | 6 grains |
| Confection of Roses | 6 grains |

DOSE—3 to 5 grains. (½ grain of opium and 3 grains of lead in 4 grains.)

### Pilula Saponis Composita (*Opium Pills*).

| | |
|---|---|
| Opium, in powder | ½ ounce |
| Hard Soap, in powder | 2 ounces |
| Distilled Water | q.s. |

DOSE—3 to 5 grains. (1 grain of Opium in 5 grains.)

### Pulvis Cretæ Aromaticus c Opio.

| | |
|---|---|
| Aromatic Powder of Chalk | 9¾ ounces |
| Opium, in powder | ¼ ounce |

DOSE—10 to 40 grains. (1 grain of Opium in 40 grains.)

### Pulvis Ipecacuanhæ Compositus (*Dover's Powder*).

| | |
|---|---|
| Ipecacuanha Root, in powder | ½ ounce |
| Opium, in powder | ½ ounce |
| Sulphate of Potash | 4 ounces |

DOSE—5 to 15 grains. (1 grain of Opium in 10 grains.)

### Pulvis Kino Compositus.

| | |
|---|---|
| Kino, in powder | 3¾ ounces |
| Opium, in powder | ¼ ounce |
| Cinnamon Bark, in powder | 1 ounce |

Dose—5 to 20 grains. (1 grain of opium in 20 grains.)

### Pulvis Opii Compositus.

| | | |
|---|---|---|
| Opium, in fine powder | | 1½ ounce |
| Black Pepper | do. | 2 ounces |
| Ginger | do. | 5 ounces |
| Caraway Fruit | do. | 6 ounces |
| Tragacanth | do. | ½ ounce |

Dose—2 to 5 grains. (1 grain of Opium in 10 grains, 24 grains to 1 fluid drachm of syrup, form Conf. Opii P.B.)

### Suppositoria Plumbi Composita.

| | |
|---|---|
| Acetate of Lead | 36 grains |
| Opium, in powder | 12 grains |
| Benzoated Lard | 42 grains |
| White Wax | 10 grains |
| Oil of Theobroma | 80 grains |

Divide into 12 equal parts (1 grain of Opium in each).

### Tinctura Camphoræ Composita (*Paregoric*).

| | |
|---|---|
| Opium, in coarse powder | 40 grains |
| Benzoic Acid | 40 grains |
| Camphor | 30 grains |
| Oil of Anise | 30 minims |
| Proof Spirit ad | 20 fluid ounces |

Macerate 7 days, then filter

Dose—15 minims to 1 drachm. (¼ grain of Opium in 1 drachm.

### Tinctura Opii (*Laudanum*).

| | |
|---|---|
| Opium, in coarse powder | 1½ ounce or 656 grains |
| Proof Spirit | ad. 20 fluid ounces |

Macerate 7 days, and filter.

*Incompatibles*—The alkalies, their carbonates, and most metallic salts.

Dose—5 to 40 minims. (1 grain of opium in 14 2-3rd minims.

*Antidotes*—The stomach pump, emetics, stimulants, compelled exertion, artificial respiration.

### Tinctura Opii Ammoniata (*Scotch Paregoric*).

| | |
|---|---|
| Opium, in coarse powder | 100 grains |
| Saffron, cut small | 180 grains |
| Benzoic Acid | 180 grains |
| Oil of Anise | 1 fluid drachm |
| Strong Solution of Ammonia | 4 fluid ounces |
| Rectified Spirit | 16 fluid ounces |

Macerate 7 days, then strain, press, filter, and add spirit to 1 pint.

Dose—½ to 1 drachm. (1 grain of powdered opium in 96 minims.)

### Trochisci Opii.

| | |
|---|---|
| Extract of Opium | 72 grains |
| Tincture of Tolu | ½ fluid ounce |
| Refined Sugar, in powder | 16 ounces |
| Gum Acacia, in powder | 2 ounces |
| Extract of Liquorice | 6 ounces |
| Distilled Water | q.s. |

Divide into 720 lozenges.

Dose—1 to 6. (Each lozenge contains 1-10th grain of extract opium.)

**Unguentum Gallæ c Opio.**

| | |
|---|---|
| Ointment of Galls | 1 ounce |
| Opium, in powder | 32 grains |

**Vinum Opii.**

| | |
|---|---|
| Extract of Opium | 1 ounce |
| Cinnamon Bark, bruised | 75 grains |
| Cloves, bruised | 75 grains |
| Sherry | ad 20 fluid ounces |

Macerate 7 days, then filter.

It is about ¼ stronger than the Edinburgh and Dublin, but 1-5th weaker than the London, and corresponds in strength with Extractum Opii Liquidum. Contains 1 grain of Extract of Opium in 22 minims.

*Incompatibles*—The alkalies, their carbonates, and most metallic salts.

Dose—10 to 40 minims.

SANGUINARIÆ RADIX, Blood Root. The dried rhizome of *Sanguinaria Canadensis*, a native of Canada.

**Botanical Source.**—This plant, called frequently the *Red Puccoon*, is a stemless herb, with grey reniform leaves having red veins, and a solitary white flower.

**Description.**—A large knobby perennial rhizome with a bitter acrid taste, and having internally a bright orange red colour.

**Uses.**—It is official in the United States' Pharmacopœia, and employed as expectorant, diaphoretic, and emetic in croup and hepatic congestion. In large doses it is cardiac, depressive, and a narcotic poison. The U.S.P. has a tincture (1 in 10) and an alcoholic extract.

**Chemistry.**—It contains a resin, and an alkaloid called Sanguinaria $C_{19}H_{17}NO_4$.

## NATURAL ORDER.—CRUCIFERÆ (*vel* BRASSICACEÆ.)

Edible and non-poisonous herbs with alternate and exstipulate leaves; inflorescence indefinite; calyx 4 sepals inferior; corolla 4 petals cruciform; stamens 6 tetradynamous and hypogynous; pistil superior; placentæ 2 parietal; fruit, a siliqua or silicula; seeds exalbuminous.

**ARMORACIÆ RADIX, Horseradish Root.**—The fresh root of *Cochlearia Armoracia*, cultivated in Britain.

**Botanical Source.**—The horseradish is almost too well known to require description. It has large ovate-oblong radical leaves with a well marked acutely crenate margin. The flower stalk bears a few small sessile lanceolate and serrate leaves, and the inflorescence is a raceme of small white flowers; the fruits being small ovate siliculæ.

**Description.**—A long fleshy, *cylindrical* root, up to 1 inch in diameter and giving off certain short shoots at the crown. *It is whitish both externally and internally and it does not turn pink when scraped.* These two last points serve easily to distinguish it from fresh aconite root, which has been sometimes mistaken for it with disastrous consequences.

**Uses.**—Stimulant, diuretic and diaphoretic. Externally rubefacient, but more feeble than mustard.

**Chemistry.**—Contains *Sinigrin* and *Myrosin*, by the mutual action of which in the presence of water it develops and yields about 2 per cent. of volatile oil of mustard. (*See* Black Mustard.)

**Spiritus Armoraciæ Compositus.**

| | |
|---|---|
| Horseradish, scraped | 20 ounces |
| Bitter Orange Peel, cut small and bruised | 20 ounces |
| Nutmeg, bruised | ¼ ounce |
| Proof Spirit | 1 gallon |
| Water | 2 pints |

Distil 1 gallon.

Dose—1 to 2 drachms (8 grains of horseradish in 1 fluid drachm).

If this preparation be desired to be really active the scraped radish should be allowed to be steeped in the water for 24 hours before adding the spirit, which latter prevents the formation of essential oil by coagulating the Myrosin.

**SINAPIS ALBÆ SEMINA, White Mustard Seed.**—The seeds of *Sinapis alba* from indigenous plants.

**SINAPIS NIGRÆ SEMINA, Black Mustard Seed.**—The seeds of *Sinapis nigra*, from indigenous plants.

**Botanical Source.**—Both mustards are annual herbs, with the lower leaves rough and lyrate in the black, and pinnatisected in the white. The upper leaves of the black are small and linear lanceolate. Both have racemes of yellow cruciform flowers, those of the white being larger. The fruits of both are siliquæ, but those of the *black* are small, erect, and *smooth*, while the *white* has spreading fruits shorter and broader and all *markedly hispid.*

**Description.**—The commercial article is the powder obtained by grinding the *mixed* seeds. It should contain no flour or starch, turmeric or capsicum; all of which may be detected by the microscope.

**Uses.**—A local stimulant and rubefacient. Especially useful as a stimulating emetic in cases of narcotic poisoning.

**Chemistry.**—Both seeds contain 23 per cent. of a fixed oil which is separated by expression, and they also each have about 20 per cent. of mucilage. There is also an albuminous ferment called *Myrosin* which exists to a small extent in the black, and up to 15 per cent. in the white, and is soluble in water being coagulated and rendered inactive by heating the solution above 140° F. or by the addition of alcohol. The real active agent, however, is the *essential oil of mustard*, which produces the acridity, but which does not exist ready formed in either seed, being obtained by a fermentation when *black* mustard seeds are steeped in water after removal of the fixed oil. The essential oil so formed is *Allyl sulphocyanate* $C_3H_5CNS$, and may be isolated by distillation with the water. The formation of this oil is due to the action of the *Myrosin* upon a substance known as *Sinigrin* or *Potassium Myronate*, which exists only in the black mustard. This body has the formula of $C_{10}H_{18}KNS_2O_{10}$, and may be regarded as consisting of allyl sulphocyanate, potassium hydrosulphate and glucose, into which three substances it splits up under the influence of the *Myrosin*, thus (taking the most simple view):—

$$\underset{\substack{\text{Potassium}\\ \text{Myronate.}}}{C_{10}H_{18}KNS_2O_{10}} = \underset{\substack{\text{Oil of}\\ \text{Mustard.}}}{C_3H_5CNS} + \underset{\substack{\text{Potassium}\\ \text{Hydrosulphate.}}}{KHSO_4} + \underset{\substack{\text{Glucose.}\\ \phantom{x}}}{C_6H_{12}O_6}$$

As the amount of *Myrosin* present in the black seeds is sometimes not sufficient to act thoroughly on all the *Sinigrin*, it is advisable to mix in a little white mustard when making the oil. The oil produced is equal to about ·5 per cent. of the weight of the mustard employed and is very pale yellow; sp. gr. 1·015. It is a powerful vesicant. *Sinigrin* may be isolated from black mustard (after the removal of the fixed oil) by boiling out with alcohol. It crystallises in needles with a cooling bitterish taste. The acridity of white mustard is due to the action of the *Myrosin* on a substance called *sinalbin* $C_{30}H_{44}N_2S_2O_{16}$, which under the quasi fermentation breaks up into acrinyl sulphocyanate $C_7H_7(CNS)O$ together with sulphate of sinapin $C_{16}H_{25}NO_5SO_4$ and glucose $C_6H_{12}O_6$. Of these the acrid principle is the acrinyl sulphocyanate. It is a volatile oil, but is not produced in sufficient quantity to be worth isolating, and therefore, the true *Oleum Sinapis* B.P. is the allyl sulphocyanate from the black mustard, as described above.

### Cataplasma Sinapis.

| | |
|---|---|
| Mustard, in powder | 2½ ounces |
| Linseed Meal | 2½ ounces |
| Boiling Water | 10 fluid ounces |

### Charta Sinapis.

| | |
|---|---|
| Solution of Gutta-percha q.s. or | 2 fluid ounces |
| Black Mustard Seeds, in powder | 1 ounce |

Mix the mustard with the gutta-percha solution so as to form a semi-fluid mixture; pour it on a dinner-plate, and pass one side of strips of cartridge paper over its surface, then lay the paper on a table with the coated side upwards until dry. Before being applied to the skin, let the mustard paper be immersed for a few seconds in tepid water.

### Linimentum Sinapis Compositum.

| | |
|---|---|
| Oil of Mustard | 1 fluid drachm |
| Ethereal Extract of Mezereon | 40 grains |
| Camphor | 120 grains |
| Castor Oil | 5 fluid drachms |
| Rectified Spirit | 4 fluid ounces |

Dissolve the extract and camphor in the spirit, and add the oils. (12 minims of oil of mustard in 1 fluid ounce.)

## NATURAL ORDER. CANELLACEÆ.

**CANELLÆ ALBÆ CORTEX, Canella Bark.** The bark of *Canella alba*, imported from the West Indies.

**Botanical Source.**—The *Canella alba* (or *Wild Cinnamon*) is a tree growing freely in most of the islands of the West Indies, but specially utilised in the Bahama Islands.

**Collection.**—The tree is first gently beaten so as to remove the greater part of the epiphlœum, and then the remaining portions of the bark are peeled off, and dried in the shade.

**Description.**—In crooked and irregular quills or channelled pieces, yellowish-white in colour. The outer surface has here and there patches of the epiphlœum dotted with minute lichens, while the inner surface is marked with longitudinal fissures caused by the beating. It has an aromatic cinnamon-like odour, and a peppery taste.

**Uses.**—Aromatic bitter tonic and stomachic. Dose, 10 to 30 grains, in powder. Still much sought after by old-fashioned country people as a powder mixed with aloes, known as Hiera Picra.

It is an ingredient in Vinum Rhei, 60 grains to 1 pint.

**Chemistry.**—The essential constituent is a volatile oil about ·94 per cent. Canella also contains 8 per cent. of mannite, gum resin, starch, and a bitterish extract.

The bark is quite free from tannic and gallic acids, and is thus distinguished from Winter's Bark, by giving no re-action with ferric salts.

## NATURAL ORDER. POLYGALACEÆ.

**SENEGÆ RADIX.** The dried root of *Polygala Senega*, imported from North America.

**Botanical Source.**—The *Polygala Senega* is a perennial plant with short herbaceous stems, and spikes of white flowers resembling those of the ordinary *Milkwort.* It grows in rocky places, chiefly in the Western States.

**Description.**—A knotty root-stock, with contorted roots, yellowish grey in colour, and characterised by *a* *keel-shaped ridge running like a shrunken sinew through the principal root.* The bark has a sourish odour and an acrid taste, causing a flow of saliva.

**Uses.**—Diuretic, diaphoretic, and stimulant, but in large doses emetic and cathartic. Useful in bronchial affections and whooping cough.

**Chemistry.**—Senega root contains a little volatile oil, traces of resin, gum, salts of malic acid, and sugar, but appears to owe its medicinal properties to *Polygalic Acid*, or *Senegin*, of which it yields 5½ per cent. It is closely allied to *Saponin*, and is amorphous, and insoluble in ether and cold water; it forms a frothing solution with boiling water, and dissolves in alkaline liquids with a greenish yellow colour.

**Infusum Senegæ.**

| | |
|---|---|
| Senega Root, bruised .................. | ½ ounce |
| Boiling Distilled Water ................ | 10 fluid ounces |

Infuse in a covered vessel for 1 hour, and strain.

Dose—1 to 2 ounces.

**Tinctura Senegæ.**

| | |
|---|---|
| Senega, in coarse powder .............. | 2½ ounces |
| Proof Spirit ........................ad | 20 fluid ounces |

Macerate 48 hours, then percolate.

Dose—½ to 2 drachms. (7 grains of Senega in 1 fluid drachm.)

**Adulteration.**—The root of *Panax quinquefolium* (American Ginseng) is a spindle-shaped root, quite distinct in appearance from true Senega. Also, *Asclepias vincetoxicum* (rhizome).

## RADIX KRAMERIÆ, Rhatany Root.

The dried root of *Krameria triandra*, from Peru.

**Botanical Source.**—The *Krameria triandra* is a small shrub with silver-grey leaves and red flowers, growing in sandy and elevated spots in Peru and Bolivia.

**Description.**—It is about an inch in diameter, with numerous branches, reddish brown rough exterior, and yellowish red interior; the bark being easily separable from the wood.

**Uses.**—Astringent, like catechu. A constituent in most astringent dentifrices.

**Chemistry.**—The only part of the drug having active properties is the cortical portion, which contains about 20 per cent. of a peculiar form of tannin called Rhatania-tannic Acid, closely related to catechu-tannic acid. Rhatany also contains wax, gum, and uncrystallisable sugar.

The root contains no gallic acid.

Rhatania-tannic acid does not give a precipitate with tartar-emetic, and is converted by boiling with dilute acids into sugar and *rhatany red* $C_{26}H_{22}O_{11}$.

**Extractum Krameriæ.**

| | |
|---|---|
| Rhatany, in coarse powder ............ | 16 ounces |
| Distilled Water ...................... | 1½ gallon or q.s. |

**Dose—5 to 20 grains.**

**Infusum Krameriæ.**

| | |
|---|---|
| Rhatany Root, bruised ................ | ½ ounce |
| Boiling Distilled Water ............... | 10 fluid ounces |

**Infuse in a covered vessel for 1 hour, and strain.**

***Incompatibles*—Salts of iron, lime water, and all substances acted on by vegetable astringents.**

**Dose—1 to 2 ounces.**

**Pulvis Catechu Compositus.** (1 in 5.)

**Tinctura Krameriæ.**

| | |
|---|---|
| Rhatany, in coarse powder ............ | 2½ ounces |
| Proof Spirit ........................ad | 20 fluid ounces |

**Macerate 48 hours, then percolate.**

**Dose—½ to 2 drachms. (7 grains of Rhatany in 1 fluid drachm.)**

**Substitutions.**—There are several other species, the chief of which is the Savanilla or New Granada Rhatany, derived from the *Krameria tomentosa*, which is in straight pieces of a dull purplish brown colour, with a thick smooth cortical portion marked with longitudinal furrows.

Sections of Peruvian Rhatany are turned grey by ferric chloride, whereas Savanilla is turned violet.

## NATURAL ORDER.—GUTTIFERÆ.

This order is characterised by a combination of opposite and leathery leaves, indefinite hypogynous stamens, and sessile radiant stigmas.

**CAMBOGIA, Gamboge.** The gum-resin obtained from *Garcinia Morella* (*var β. Pedicellata*) imported from Siam.

**Botanical Source.**—The plant yielding Gamboge is a tree with laurel-like leaves, and small yellow diœcious flowers.

**Collection.**—The Gamboge is chiefly secreted in large vessels contained in the bark. It is obtained by making an oblique incision in the bark, extending half way round the trunk, and fixing a joint of bamboo at the lower end of the cut to receive the sap which slowly exudes for several months; this forms pipe gamboge.

Sometimes the juice obtained from the broken leaves and twigs is allowed to flow into cocoa-nut shells, and afterwards removed to earthen vessels, in which it hardens by exposure, forming lump gamboge. Each tree yields on an average a pipe about 20 inches by 1¼ inch, and suffers no injury provided the tapping is not more frequent than every other year.

**Uses.**—Drastic, purgative, and anthelmintic. Useful in obstinate costiveness and dropsy. Dose 1 to 4 grains.

**Chemistry.**—The pipe-gamboge of Siam has been found by Sir R. Christison to contain 72·2 per cent. of resin, 23 per cent. of gum, and 4·8 per cent. of moisture. The resin forms coloured solutions with ammonia or the fixed alkalies, and gives a copious yellow precipitate with *basic* acetate of lead and brown precipitates with solutions of iron and copper.

**Specially Distinctive Tests.** — (1.) Imperfectly soluble both in chloroform and ether.

(2.) The ether solution, after filtration, does not become turbid with alcohol.

(3.) Imperfectly soluble in alcohol, and the solution gives a yellow but clear mixture with ammonium hydrate.

(4.) The filtered alcoholic solution evaporated, and a portion of the residue treated with alcoholic ferric chloride (1 in 10), gives a dark colour.

(5.) Alcoholic plumbic acetate gives no precipitate with the remainder of the residue dissolved in alcohol.

**Pilula Cambogiæ Composita.**

| | |
|---|---|
| Gamboge | 1 ounce |
| Barbadoes Aloes | 1 ounce |
| Comp. Powder of Cinnamon | 1 ounce |
| Hard Soap, in powder | 2 ounces |
| Syrup | q.s. |

DOSE—5 to 10 grains. (1 grain each Aloes and Gamboge in 6 grains nearly.)

**Varieties.**—(1st). *Pipe Gamboge*, in sticks or cylinders, bright yellow in colour, and varying up to 2 inches in thickness. They are striated externally by the action of the bamboo moulds.

(2nd). *Lump* or *Cake Gamboge*, in round cakes or masses of several pounds' weight, and inferior in quality.

(3rd). *Coarse Gamboge*, simply fragments and inferior pieces, much mixed and very dirty, and of low value.

**Adulteration.**—Pieces of wood and starch; an emulsion made with boiling water, and cooled, does not become green with the solution of iodine (absence of the latter). The Cambodians themselves sometimes adulterate the lump variety with rice flour or the powdered bark of the tree. The adulterations all remain undissolved after the gum resin has been successively exhausted by alcohol and water.

**GARCINIÆ OLEUM, Mangosteen Oil,** *Kokum Butter.*—A concrete oil obtained by bruising the seeds of *Garcinia Indica*, and subsequently boiling them with water, when the fat rises and may be skimmed off. It is used in the Pharmacopœia of India for making suppositories, and it has been imported to serve as an ingredient in artificial butter.

## NATURAL ORDER.—DIPTEROCARPEÆ.

**BALSAMUM DIPTEROCARPI, Gurjun Balsam,** *Wood Oil.*—An oleo-resin obtained from *Dipterocarpus turbinatus* and several other allied species by incision and heat. Imported from Singapore and also from Southern India.

This oleo-resin contains about 45 of volatile oil and 55 of resin. It is used as a substitute for Balsam of Copaiba, from which it may however be distinguished by heating in a sealed glass tube to 270° F., when it will become a solid mass, while the Copaiba remains fluid.

## NATURAL ORDER.—MALVACEÆ.

Herbs, shrubs, or trees, with alternate and usually palmated and stipulate leaves; inflorescence axillary—calyx inferior, persistent and valvate in æstivation; corolla regular and twisted in æstivation; stamens indefinite, monadelphous and hypogynous, with one-celled reniform anthers; pistil usually syncarpous with a branched stigma; fruit a carcerule or more rarely a capsule.

**ALTHÆÆ RADIX, Marshmallow Root,** *Racine de Guimauve.*—The scraped and dried root of *Althæa officinalis* from the South of France and Spain; also cultivated in Britain.

**Botanical Source.**—The true marshmallow is a herb with a perennial root and erect pubescent stem 2 to 3 feet high. The leaves are ovate in shape, having a serrate margin and two distinct lobes standing out from the broadest portion, the whole being downy on both sides. The inflorescences are axillary cymes of a pale rose colour. The flowers are regular with an epicalyx, monadelphous stamens and carcerule fruit.

The plant is to be distinguished from the common mallow of our road sides *(Malva sylvestris)* which has palmately-lobed leaves, ***not pubescent***, flowers usually of a reddish purple, and is altogether a lower growing plant.

**Collection.**—The roots of the biennial cultivated plant are collected and the outer coating and rootlets are scraped off before drying.

**Description.**—White sticks about the thickness of a finger, deeply furrowed longitudinally and marked here and there with brown scars.

**Uses.**—Demulcent and emollient; used in making jujubes.

**Chemistry.**—The chief value of the root lies in the large quantity of mucilage it yields, about 25 per cent. This is supposed to be *bassorin*, $C_{12}H_{20}O_{10}$, differing from arabin in being precipitated by normal plumbic acetate. It also contains about 2 per cent. of *asparagin*, a neutral and inert body, together with starch and sugar.

**Syrupus Althææ** (*Pharm. Lond.*)

Macerate 1¼ ounce in one pint of cold water, and then add 3 lbs. sugar and ½ fluid drachm rectified spirit to each fluid ounce. Dose—1 to 5 fluid drachms.

**GOSSYPIUM, Cotton Wool,** ***Carded Cotton.***—The hairs from the *testa* of various species of gossypium; imported chiefly from America, and carded.

**Description.**—Under the microscope cotton fibres are seen to be transparent, flattened, and peculiarly twisted, and they are thus easily distinguished from flax and silk.

**Uses.**—As a dressing for wounds and burns.

**Chemistry.**—Cotton is nearly pure *cellulose*, $C_6H_{10}O_5$, by treatment with a mixture of strong nitric and sulphuric acids, and subsequent copious washing with water, it forms nitro-cellulose in one of three degrees of substitution. The dinitro-cellulose, $C_6H_8(NO_2)_2O_5$, is pyroxylin, B.P., which is soluble in a mixture of alcohol and ether to form *collodion*, while the trinitro-cellulose, $C_6H_7(NO_2)_3O_5$, is the ordinary explosive known as gun-cotton.

## NATURAL ORDER.—STERCULIACEÆ.

[*Ascribed also to* BYTTNERIACEÆ.]

**THEOBROMÆ SEMINA, Cocoa Nibs,** *Cacao.*—The slightly roasted and partially crushed seeds of *Theobroma Cacao.* Imported in their raw state from Mexico and the West Indies.

**Botanical Source.**—The *T. Cacao* is a small tree bearing large capsules filled with seeds, which each possess a succulent and membranous arillode.

**Description.**—Found in commerce in "nibs," and also in powder as prepared cocoa, usually then deprived of part of its fat and mixed with starch and sugar.

**Uses.**—Dietetic; nourishing without astringency.

**Chemistry.**—The seeds contain about 88 per cent. of actual kernel, and this yields about 50 to 55 per cent. of fat, 22 to 24 of sugar, 17 of vegetable albumen, and 1 to 1·5 per cent. of *Theobromine*, $C_7H_8N_4O_2$. This latter is an alkaloid closely resembling *Caffeine.*

**THEOBROMÆ OLEUM, Cocoa Butter.**—A concrete oil obtained in Britain by expression and heat from the ground seeds of *Theobroma Cacao.*

**Description.**—A very pale yellowish fat with a pleasant odour of chocolate, having a specific gravity of ·961, and fusing between 84° and 86° F.

**Chemistry.**—*Cocoa Butter* is chiefly *stearin* with a little *palmatin* and *olein*, and is therefore capable of saponification by alkalies. It is entirely soluble in twice its weight of *benzol* at 50° F. It enters into the composition of

**Suppositoria—**

| | |
|---|---|
| Acidi Tannici | 1 in 2 |
| Hydrargyri | 1 in 2 |
| Morphiæ | 1 in 2 |
| Plumbi Composita | 4 in 9 |

## NATURAL ORDER.—SAPINDACEÆ.

This order is that to which the well-known horse-chesnut tree (*Æsculus Hippocastanum*) belongs.

**GUARANA, Guarana Bread.**—The pounded and prepared seeds of *Paullinia sorbilis*, imported from Brazil.

**Collection.**—The seeds are pounded into a soft mass and then made into rolls or cakes and dried.

**Description.**—In heavy dark red granular-looking cakes or masses, like large sausages.

**Uses.**—Recommended in nervous headache and some kinds of neuralgia.

**Chemistry.**—The active principle is *Theine* or *Caffeine*, which exists in the large proportion of 5 per cent.

## NATURAL ORDER.—LINACEÆ.

This order is allied to the Malvaceæ, but has exstipulate leaves, calyx with imbricate æstivation, and stamens definite, and only slightly monadelphous at the bottom. The ovaries have their styles, as well as their stigmas, distinct. The order is remarkable for the fine development of the fibres of the endophlœum.

**LINI SEMINA, Linseed.**—The seeds of *Linum Usitatissimum*, cultivated in Britain.

**Botanical Source.**—The *L. usitatissimum* is an annual herb about 1¼ foot high with linear-lanceolate, sessile, glabrous and alternate leaves. The flowers are in terminal cymes, and the corolla is sky-blue in colour, with petals having a twisted æstivation. It is extensively cultivated in Europe for the manufacture of linen and flax, both of which are spun from the inner bark fibres, the latter being separated by macerating the plant in water and then stripping off the bark and beating with a flat stick till the fibres separate.

**Description.**—Small flat oval seeds with acute edges and a smooth polished brown testa and yellowish cotyledons.

**Uses.**—Emollient and demulcent.

**Chemistry.**—The testa of the seeds contains about 15 per cent. of the special mucilage already described under *Althæa* (page 73), while the embryo or body of the seed yields about 30 per cent. of fixed oil and 25 per cent. of vegetable albumen and some sugar

**Farina Lini.**

The pulverised cake of linseed left after expression of the fixed oil. This article, known as *Linseed Meal*, is used in making all the official *Cataplasmata* except C. Fermenti.

**Cataplasma Lini.**

| | |
|---|---|
| Linseed Meal | 4 ounces |
| Olive Oil | ½ fluid ounce |
| Boiling Water | 10 fluid ounces |

The water extracts the mucilaginous matter from the meal, and causes it to swell, while the oleaginous matter which has been removed in the manufacture of the meal is restored by the addition of the more elegant and savoury olive oil.

**Infusum Lini.**

| | |
|---|---|
| Linseed | 160 grains |
| Fresh Liquorice Root, sliced | 60 grains |
| Boiling Distilled Water | 10 fluid ounces |

Infuse in a covered vessel for 4 hours, and strain.

*Incompatibles*—Most metallic salts.

**Adulteration.**—Linseed simply crushed is usually fairly good, but the meal is subject to adulteration with mustard, rape, and cotton seed cakes. The two former may be recognised by the development of acrid essential oils when the meal is macerated in water, and the latter by the microscope. A cooled decoction of pure linseed meal should give no blue with iodine.

**LINI OLEUM, Linseed Oil.**—The oil expressed without heat from the seeds of the plant above described.

**Description.**—A yellow viscid oil, with a slight but somewhat sickly odour, which has a specific gravity of ·902, and dries by exposure to the air. *Boiled linseed oil* is made by heating the ordinary oil with oxide of lead. It dries much more rapidly than the raw oil. An inferior oil is obtained by expressing at 200° F.

**Uses.**—Made into an emulsion with lime water, it affords an excellent application to burns and scalds. It is the chief oil used in painting.

**Chemistry.**—The raw oil is chiefly olein, with a little stearin and myristin. When saponified, and the soap decomposed by acids, it yields 95 per cent. of fatty acids, chiefly linoleic acid, $C_{16}H_{28}O_2$. This acid is peculiar to drying oils, and is not even homologous with the ordinary oleic acid. It is converted by the action of the air into oxylinoleic acid, $C_{16}H_{28}O_5$, which is resinous. Boiled oil prepared as above rapidly changes into a solid transparent varnish called *Linoxyn*, $C_{32}H_{54}O_{11}$. Linseed oil is soluble in alcohol and ether, and when treated with a caustic alkali it becomes blood red. It is not affected by nitric acid of 1.18 sp. gr. (distinction from hemp seed oil, which turns green), but is turned green by sulphuric acid, sp. gr. 1.47. Its solubility in alcohol would serve to detect it if added to olive oil.

## NATURAL ORDER.—ZYGOPHYLLACEÆ.

### GUAIACI LIGNUM, Guaiacum Wood,

*Lignum Vitæ.*—The wood of *Guaiacum officinale*, imported from St. Domingo and Jamaica, and reduced to chips and coarse powder by the turning lathe.

**Botanical Source.**—The *G. officinale* is a large evergreen tree, with paripinnate leaves and pale blue flowers. Another source of the wood of commerce is the *G. sanctum.*

**Description.**—Greenish brown chips, becoming more green by exposure to light, and very heavy, having a sp. gr. of 1·33, and consequently sinking in water.

**Uses.**—An ingredient in Decoctum Sarzæ Compositum.

**GUAIACI RESINA, Guaiacum Resin.**—A resin obtained by exudation, incision or heat, from the stem of *G. officinale* above described.

**Collection.**—By exudation, either naturally or after incision, the resin is obtained in small masses hardened by spontaneous evaporation. This is the fine *Guaiacum in tears.* The more ordinary (*Lump Guaiacum*) is obtained by boiling the chips in salt and water and skimming off the resin as it rises to the surface, or by cutting the wood into billets and boring a hole through longitudinally, heating one end in the fire, when the melted resin flows out of the other end. In this way the wood will yield about 25 per cent.

**Description.**—In tears or brittle masses of a greenish brown colour, with a resinous fracture and translucent edges; as usually seen in powder it is greyish green. When placed in the mouth it softens, and produces after the first moment an acrid sensation. An alcoholic solution of the resin turns the inside of a potato-peeling blue.

**Uses.**—Acrid stimulant and alterative diaphoretic. Given in chronic forms of rheumatism, and formerly used for secondary syphilis. Dose, 20 to 30 grains.

**Chemistry.**—The active principles are Guaiaconic Acid, $C_{38}H_{40}O_{10}$ (70 per cent.), and Guaiaretic Acid, $C_{20}H_{26}O_4$ (10 per cent.). They are isolated by boiling the resin with alcoholic potash and filtering, when the solution deposits crystals of potassium Guaiaretate, from which the acid may be liberated by hydrochloric acid. The alcoholic mother liquor is then acidulated with hydrochloric acid, and the mass which separates is washed with water and extracted by ether, which leaves on evaporation the *Guaiaconic Acid.* It is to this latter that the property of turning green in the presence of oxidising agents possessed by Guaiacum is due. Guaiacum may be detected in any mixture by evaporating to dryness and distilling with a gradually-increasing heat, when it yields first a colourless aromatic liquid which gives a green with potassium hydrate, and afterwards a sublimate of pearly crystals, which are turned blue by warm sulphuric acid and green by ferric chloride.

**Specially Distinctive Tests.**—*Ordinary Guaiacum* is—1. Completely soluble in chloroform; soluble in ether, and the latter solution is not rendered turbid on the addition of alcohol.

2. It is perfectly soluble in alcohol, and the solution is coloured blue by alcoholic ferric chloride (1 in 10), and is also precipitated by saturated alcoholic plumbic acetate.

3. Sulphuric acid dissolves the solid resin to a cherry-red solution. *Peruvian Guaiacum* differs by giving a greenish brown with the ferric chloride, and the plumbic acetate precipitate re-dissolves on boiling, giving a solution which is coloured red by bromine in chloroform (1 in 20).

**Mistura Guaiaci.**

| | |
|---|---|
| Guaiacum Resin, in powder | ½ ounce |
| Sugar | ½ ounce |
| Gum Acacia, in powder | ¼ ounce |
| Cinnamon Water | 20 fluid ounces |

Dose—½ to 2 ounces (11 grains of Guaiacum Resin in 1 fluid ounce).

**Tinctura Guaiaci Ammoniata.**

Guaiacum Resin, in fine powder ........ 4 ounces
Aromatic Spirit of Ammonia ........ad. 20 fluid ounces

Macerate 7 days.

*Incompatibles*—Acids; acidulous, earthy and metallic salts.

Dose—½ to 1 drachm (11 grains of Guaiacum Resin in 1 fluid drachm).

Guaiacum Resin is also contained in Pilula Hydrargyri Subchloridi Composita (1 in 2½).

**Adulteration.**—The chief admixture to which this body is subject is *common resin*, detected by pouring a tincture into water, and then carefully adding solution of potassium hydrate until the solution just clears. If common resin be present a further addition of potash will cause a precipitate. The smell on heating is also a simple guide.

## NATURAL ORDER.—RUTACEÆ.

Trees or shrubs (rarely herbs) with exstipulate and dotted leaves and perfect flowers; calyx 4—5 segments, imbricate; corolla 4—5 petals usually valvate; stamens, usually 5 or 10, hypogynous; pistils superior syncarpous 2—5 carpels, more or less inclined to be distinctly lobed; fruit capsular.

**RUTÆ OLEUM, Oil of Rue.**—The oil distilled in England from *Ruta graveolens.*

**Botanical Source.**—The common *Rue* is a small evergreen under-shrub with pale green bipinnate leaves, with the leaflets thick and inclined towards an obovate shape. The flowers are greenish yellow, and the inflorescence is a corymbose cyme. The stamens are hypogynous and the ovary 4-5 lobed.

**Collection.**—The plant is cut after flowering when the fruits are nearly ripe, and the whole cuttings are distilled with water.

**Description.**—Pale yellow, with a characteristic odour. Sp. gr. ·911.

**Uses.**—Anti-spasmodic and emmenagogue. Used in hysteria, epilepsy, and flatulent colic. Externally it is an acrid stimulant and rubefacient. There is no dose mentioned in the B.P., but from 1 to 3 minims may be administered.

**Chemistry.**—Its chief constituent is *Euodic aldehyd*, $C_{11}H_{22}O$, together with a hydrocarbon isomeric with turpentine, and *lauric aldehyd*, $C_{12}H_{24}O$. By prolonged exposure to oxidising agents (as $HNO_3$) it forms *rutic acid*, $HC_{10}H_{19}O_2$, with a little *pelargonic acid*, $HC_9H_{17}O_2$.

**CUSPARIÆ *vel.* ANGOSTURÆ CORTEX, Cusparia or Angostura Bark.**—The dried bark of *Galipea Cusparia,* imported from tropical South America.

**Botanical Source.**—The G. *Cusparia* is a small tree growing chiefly in Venezuela.

**Description.**—In slightly quilled or flattish pieces about 1 inch thick,greyish white externally and cinnamon-coloured internally. The edges are *sharp* and *bevelled* in a very characteristic manner, and the internal surface is easily capable of being split into laminæ. A drop of nitric acid colours the internal surface a very *dull* red. The bark of Strychnos Nux vomica containing Brucia is turned blood red on the addition of nitric acid.

**Uses.**—Stimulant and tonic. In hot climates it appears to be somewhat anti-periodic, as it has been employed with success in fevers of a malignant type. 10 to 40 grains of the powdered bark may be given.

**Chemistry.**—It contains about ¼ per cent. of volatile oil, about 1½ per cent. of a neutral bitter principle called Cusparin, soluble in alcohol and acids, but sparingly so in water, and which may be obtained by spontaneous evaporation of the tincture; it is rendered greenish by nitric acid. Cusparia also contains a hard and soft resin, the latter coloured dark red by nitric acid. The bark is free from tannin, but gives a copious precipitate with ferric chloride.

**Infusum Cuspariæ.**

| | |
|---|---|
| Cusparia Bark, in coarse powder........ | ½ ounce |
| Distilled Water, 120°.................. | 10 fluid ounces |

Infuse in a covered vessel for 2 hours, and strain.

*Incompatibles*—Most metallic salts and tincture of galls.

DOSE—1 to 2 ounces.

BUCHU FOLIA.—The dried leaves of *Barosma betulina*, *crenulata* and *serratifolia*, imported from the Cape of Good Hope.

**Botanical Source.**—All the species of *Barosma* are erect shrubs, with small coriaceous leaves with conspicuous oil glands on the under-surface and margin.

**Description.**—*Barosma betulina* is about ¾-inch long, coriaceous obovate, with a recurved truncated apex and sharp spreading teeth.

*Barosma crenulata* is about an inch long, ovate-lanceolate, obtuse, minutely crenated, five nerved.

*Barosma serratifolia* is from 1 to 1½ inch long, linear-lanceolate, tapering equally at each end, sharply and finely serrated, three nerved.

**Uses.**—Stimulant, diuretic and diaphoretic, acting specially on the urinary organs. In catarrh of the bladder, enlarged prostate, gleet and stricture it is very useful. Dose of powdered leaves, 20 to 30 grains in wine.

**Chemistry.**—Buchu leaves contain mucilaginous matter and about 1½ per cent. of volatile oil, which, on exposure to cold, deposits crystals of Barosma camphor having a peppermint odour.

### Infusum Buchu.

| | |
|---|---|
| Buchu Leaves, bruised ................ | ½ ounce |
| Boiling Distilled Water ................ | 10 fluid ounces |

Infuse in a covered vessel 1 hour, and strain.

*Incompatibles*—Salts of iron and astringent preparations.

Dose—1 to 4 ounces.

### Tinctura Buchu.

| | |
|---|---|
| Buchu Leaves, bruised ................ | 2½ ounces |
| Proof Spirit ........................ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

Dose—1 to 2 fluid drachms (7 grains of Buchu in 1 fluid drachm.

**Substitution.**—The leaves of *Empleurum serrulatum*

(Rutaceæ) grow in the same localities, and are sometimes imported and sold as Buchu. They very much resemble *B. serratifolia*, but are much narrower and terminate in an acute point. They have a different odour from Buchu.

**JABORANDI.**—The leaves mixed with the young branches of *Pilocarpus pinnatifolius*, a native of Brazil.

**Botanical Source.**—The *P. pinnatifolius* is a shrub with a light grey bark and compound imparipinnate leaves with each leaflet as large or even larger than a leaf of cherry laurel. Inflorescence in racemes.

**Description.**—Yellowish or greenish brown leathery leaflets from 4 to 6 inches long and from ¾ to 2 inches broad with the margin entire and slightly re-curved. The apex is rounded and slightly emarginate, and the veins are well marked and terminate in an undulating line just within the margin.

**Uses.**—The action of Jaborandi is sialagogue (*σίαλον* saliva, and *ἀγωγός* evoking) and sudorific in large doses causing nausea. About 60 grains of the dry or ⅓ grain of pilocarpia will cause profuse salivation and sweating within 15 minutes, which will continue for about 1 hour.

**Chemistry.**—The leaves of this plant contain an alkaloid called *pilocarpia*, to which the sialagogue and sudorific properties of the plant appear to be due. It is a colourless crystalline substance, soluble in water, alcohol, and in chloroform, forming crystalline salts with acids of which the hydrochlorate is deliquescent and soluble in alcohol, and the nitrate is permanent and insoluble in alcohol. It has been obtained (by Mr. Gerrard) by the following process:—Prepare a soft extract with proof spirit; digest this with water, filter and wash; evaporate the filtrate to a soft extract, cautiously add ammonia in slight excess, shake with chloroform, separate the latter and evaporate; the residue is impure pilocarpia, which may subsequently be purified by solution in acidulated water, and re-crystallisation from chloroform.

The leaves also contain a volatile oil, tannic acid, and acrid resin.

**Adulteration.**—There are no adulterations yet known, but the leaves might very readily be mistaken for those of cherry laurel. The latter, however, are *alternate leaves*, while Jaborandi has *opposite leaflets*. The leaves of the laurel are also slightly serrate towards the apex, while Jaborandi leaflets are perfectly entire.

## NATURAL ORDER.—AURANTIACEÆ.

Trees or shrubs closely allied to Rutaceæ by abounding in oil vesicles, but they are distinguished from every other order by their characteristic fruit—namely, the *hesperidium.*

**AURANTII CORTEX, Bitter Orange Peel.**—The rind of the ripe fruit *Citrus vulgaris*, variety *Bigaradia*, imported from Seville and the south of Europe generally.

**Botanical Source.**—The orange tree is from 16 to 20 feet high, with simple ovate-acuminate leaves articulated to a winged petiole, and fine large white fragrant flowers. The fruit is a *hesperidium*, having the epicarp and mesocarp united in the rind, and the endocarp running in and dividing the pulp into lobes. The *C. bigaradia*, or bitter orange, has axillary spines on its branches, and a small deep-coloured fruit, while the *C. Aurantium*, or sweet orange, has no spines and a larger and paler fruit.

**Description.**—Good orange peel should be very thinly cut, and carefully dried. It should not be of too dark a colour, and should have as little white rind as possible.

**Uses.**—Bitter stomachic, tonic, and stimulant.

**Chemistry.**—The peel contains a bitter glucoside called ***hesperidin***, a trace of gallic acid, and a little volatile oil.

### Infusum Aurantii.

| | |
|---|---|
| Bitter Orange Peel, cut small | ½ ounce |
| Boiling Distilled Water | 10 fluid ounces |

Infuse 15 minutes in a covered vessel, and strain.

*Incompatibles*—Salts of iron.

DOSE—1 to 2 ounces.

### Infusum Aurantii Compositum.

| | |
|---|---|
| Bitter Orange Peel, cut small | ¼ ounce |
| Fresh Lemon Peel, ,, | 60 grains |
| Cloves, bruised | 30 grains |
| Boiling Distilled Water | 10 fluid ounces |

Infuse in a covered vessel 15 minutes, and strain.

*Incompatibles*—Salts of iron.

DOSE—1 to 2 ounces.

### Syrupus Aurantii.

| | |
|---|---|
| Tincture of Orange Peel | 1 fluid ounce |
| Syrup | 7 fluid ounces |

DOSE—1 drachm.

### Tinctura Aurantii.

| | |
|---|---|
| Bitter Orange Peel, bruised ............ | 2 ounces |
| Proof Spirit........................ad. | 20 fluid ounces |

Macerate 7 days, then strain, press, and filter.

Dose—1 to 2 drachms.

### Tinctura Aurantii Recentis.

| | |
|---|---|
| Bitter Orange Peel, fresh .............. | 6 ounces |
| Rectified Spirit ....................ad. | 20 fluid ounces |

Carefully cut from the orange the coloured part of the rind, in thin slices, and macerate 6 ounces of this in a pint of spirit for 7 days. Then pour off the liquid, press the dregs, mix the liquid products and filter. Finally, add sufficient spirit to make 1 pint.

Dose—1 or 2 drachms.

### Vinum Aurantii.

British wine, containing 12 per cent. of alcohol, made by the fermentation of a saccharine solution, to which the fresh peel of the bitter orange has been added.

Also contained in Infusum Gentianæ Compositum, 120 grains to 1 pint; Mistura Gentianæ, 60 grains to 1 pint; and Tinctura Gentianæ Composita, ¾ ounce to 1 pint.

**AURANTII FLORES, Orange Flowers.**—The fresh flowers of both Citrus Bigaradia and C. Aurantium. They are used in the following preparations :—

**Aqua Aurantii Floris.**

The distilled water of the flowers of Citrus Bigaradia, and of C. Aurantium, imported from France.

**Syrupus Aurantii Floris.**

| | | |
|---|---|---|
| Orange Flower Water | | 8 fluid ounces |
| Distilled Water | q.s. or | 16 fluid ounces |
| Refined Sugar | | 48 ounces |

Product 4½ lbs. by weight, or 3 lb. 6 oz. by measure, sp. gr. 1·330.

Dose—1 drachm.

**AURANTII FLORUM OLEUM, Oil of Neroli.**—The oil prepared by distilling the fresh flowers with water in a copper still. It is commonly adulterated by the oil obtained by distilling the leaves instead of the flowers, called *Huile de petit grain.* Pure oil should have a sp. gr. of ·889 at 52° F., and should assume an intense permanent crimson colour when shaken with sodium bisulphite.

**LIMONIS CORTEX, Lemon Peel.**—The outer part of the rind of the fresh fruit of *Citrus limonum,* imported from Southern Europe.

**Botanical Source.**—The C. Limonum is a much branched and thorny shrub, with oval leaves having serrulate margin and a winged petiole. The fruit is a pale yellow egg-shaped hesperidium.

**Uses.**—Aromatic tonic, similar to orange peel.

**Chemistry.**—Similar to that of orange peel, and is employed in the following *preparations:*—Infusum Aurantii Compositum, 120 grains to 1 pint; Infusum Gentianæ Compositum, ¼ ounce to 1 pint.

**Syrupus Limonis.**

| | |
|---|---|
| Fresh Lemon Peel ..................... | 2 ounces |
| Lemon Juice, strained ................ | 20 fluid ounces |
| Refined Sugar ......................... | 36 ounces |

Product, 3½ lbs. by weight, or 2 lb. 9 oz. by measure; sp. gr. 1.340.

DOSE—1 drachm.

**Tinctura Limonis.**

| | |
|---|---|
| Fresh Lemon Peel, sliced thin.......... | 2½ ounces |
| Proof Spirit........................ad. | 20 fluid ounces |

Macerate 7 days, strain, press, and filter.

DOSE—½ to 2 drachms (7 grains of lemon peel in 1 fluid drachm).

## LIMONIS OLEUM, Oil of Lemon.—

The oil expressed or distilled from fresh lemon peel, chiefly produced in and imported from Sicily.

It is pale yellow in colour, with a sp. gr. of ·850. It consists chiefly of a hydrocarbon isomeric with turpentine, $C_{10}H_{16}$, and is soluble in 7 parts of rectified spirit.

By long keeping it deposits a fatty crystalline body called *citroptene*.

It is an ingredient in Linimentum Potassii Iodidi c Sapone and Spiritus Ammoniæ Aromaticus.

**LIMONUM SUCCUS, Lemon Juice.**—The freshly expressed juice of the ripe fruit of Citrus Limonum. (*Vide* Appendix III.)

**Uses.**—Refrigerant, ant-alkaline, and anti-scorbutic—also used for making citric acid (for process and description of this body see the author's "Pharmaceutical Chemistry."

**Chemistry.**—Lemon juice contains as its active principle about 7 per cent. of citric acid, $H_3C_6H_5O_7.H_2O$, together with a little sugar, gum, and traces of malic acid. Artificial lemon juice may be made by dissolving 1½ ounce of citric acid and ¼ ounce of sugar in 1 pint of water, and adding 3 or 4 drops of oil of lemon. The average fresh juice shows a sp. gr. of 1·039, and is supposed to contain 32½ grains citric acid per fluid ounce.

Table of the amount of lemon juice required to saturate 20 grains respectively of the following alkalies.

| TWENTY GRAINS. | LEMON JUICE. | | CITRIC ACID. |
|---|---|---|---|
| Potassium Bicarb. ...... | 3¼ fluid drachms | = | 14 grains |
| Potassium Carb. ........ | 4 fluid drachms | = | 17 grains |
| Sodium Bicarb. ........ | 4 fluid drachms | = | 17 grains |
| Sodium Carb. .......... | 2½ fluid drachms | = | 10 grains |
| Ammonium Carb. ...... | 6 fluid drachms | = | 24 grains |

Beside the species already mentioned we may note the *Citrus Bergamia* which yields the oil of bergamot, and the *Citrus Limetta* from which the well-known anti-scorbutic lime-juice is derived.

**BELÆ FRUCTUS.**—The dried half-ripe fruit of *Ægle Marmelos*, from Malabar and Coromandel.

**Description.**—A roundish fruit about the size of a large orange, with a hard woody rind; usually imported in dried slices, or in fragments consisting of portions of the rind and adherent pulp and seeds. Rind about a line and a half thick, covered with a smooth pale brown or greyish epidermis, and internally, as well as the dried pulp, brownish red or cherry-red. The moistened pulp is mucilaginous.

Mangosteen fruit (*Garcinia Mangostana*) is sometimes substituted for it, but this has a much thicker rind and no adhering pulp. The fruit of Bael is a hesperidium.

**Use.**—Held in repute in India as a remedy for dysentery, but found of little use in this country.

**Chemistry.**—The drug appears to contain only a very slight trace of tannin. The pulp and seeds furnish a large quantity of mucilage and a little sugar.

**Extractum Belæ Liquidum.**

| | |
|---|---|
| Bael Fruit | 16 ounces |
| Distilled Water | 12 pints |
| Rectified Spirit | 2 fluid ounces |

Product, 16 fluid ounces (1 fluid ounce of extract is equal to 1 ounce of the fruit).

Dose—1 to 2 drachms.

## NATURAL ORDER.—VITACEÆ.

[AMPELIDACEÆ.]

The Vine Order of climbing shrubs with swollen nodes and minute green flowers arranged in a thyrsus, with stamens equal in number to the petals, and a succulent superior fruit called a *nuculanium.*

**UVÆ PASSÆ, Raisins.**—The ripe fruit of *Vitis vinifera,* dried by the sun or by artificial heat. Imported from Spain. They enter into the composition of Tinctura Cardamomi Composita, and Tinctura Sennæ Composita.

## NATURAL ORDER.—SIMARUBACEÆ.

**SIMARUBÆ RADICIS CORTEX, Simaruba Root Bark.**—The dried cortical portion of the root of *Simaruba amara*, imported from Jamaica.

**Description.**—In long strips of thin bark folded upon themselves, of a pale greyish colour, and very fibrous in structure.

**Uses.**—It may be used in the same cases as quassia. It gained at one time some repute in the treatment of diarrhœa and dysentery, but is now little employed. Dose of the powder, 10 to 40 grains.

**Chemistry.**—The active principle is quassin, and it also contains a little volatile oil, resin, and ulmin.

**QUASSIÆ LIGNUM, Quassia Wood.**—The wood of *Picræna excelsa*, imported from Jamaica.

**Botanical Source.**—A tall tree growing on the mountains of Jamaica.

**Description.**—A dense, tough, yellowish white, odourless, intensely-bitter wood, generally in chips or raspings, but sometimes in billets.

**Uses.**—Quassia is a pure bitter, similar in operation but rather more powerful than gentian. It is employed in stomach complaints of an atonic or functional character. As it is not affected by iron or mercury, it is a useful vehicle for the administration of the salts of those metals. It is fatal to flies and other small insects.

**Chemistry.**—The active bitter principle is a neutral, odourless, crystallisable substance called Quassin, $C_{10}H_{12}O_3$, which is yielded to both dilute alcohol and water. It is insoluble in ether, and gives a precipitate with tannic acid. The wood yields about 1-10th per cent. of this substance. Quassia contains no astringent matter.

**Extractum Quassiæ.**

| | |
|---|---|
| Quassia Wood, rasped ................ | 16 ounces |
| Distilled Water ...................... | q.s. |

100 lbs. of wood yield 2 and 1-12th lbs. of extract.

Dose—3 to 5 grains (1 grain is equal to 8 fluid ounces Inf. Quassia).

**Infusum Quassiæ.**

| | |
|---|---|
| Quassia, in chips.......................... | 60 grains |
| *Cold* Distilled Water .................. | 10 fluid ounces |

Infuse in a covered vessel for ½ hour, and strain.

*Incompatibles*—Salts of lead and silver.

Dose—1 to 2 ounces.

**Tinctura Quassiæ.**

Quassia ............................. ¾ ounce
Proof Spirit........................ad. 20 fluid ounces

Macerate 7 days, and filter.

Dose—½ to 2 drachms (2 grains of Quassia to 1 fluid drachm.)

## SUB-CLASS II.—CALYCIFLORÆ.

Plants having the calyx united, the corolla distinct, and the stamens perigynous or epigynous. This sub-class has two sub-divisions:—

1. Perigynæ, having the stamens perigynous and the ovary superior.

2. Epigynæ, with the stamens epigynous and the ovary inferior.

## SUB-DIVISION I.—PERIGYNÆ.

### NATURAL ORDER.—RHAMNACEÆ.

**RHAMNI FRUCTUS**, Buckthorn Berries.—The dried fruits of *Rhamnus cathartica*, from indigenous plants.

**Botanical Source.**—The *R. cathartica* is a robust shrub with thorns. The leaves are small oval, acutely serrate, with 3 or 4 simple prominent convergent veins and stipulate. Flowers diœcious and fruit baccate.

**Collection.**—In September, when the fruit ripens.

**Description.**—Small round fruits resembling a black currant, with a greenish purple juice, and containing 4 triangular seeds.

**Uses.**—A violent hydragogue (ὕδωϵ water, ἀγωγός evoking) purgative, with a tendency to cause griping.

**Chemistry.**—Contains two crystalline glucosides, Rhamnine, $C_{18}H_{22}O_{10}$, and Rhamnegine, $C_{24}H_{32}O_{14}$. The former is only soluble in hot alcohol, and insoluble in ether; while the latter is soluble in water also. Both give deep orange solutions when treated with alkalies. The purgative principle of the berries is, however, supposed not to be due to these glucosides, but to a bitter principle as yet not properly investigated.

*Rhamni Succus* (Buckthorn juice).—The recently expressed juice of the ripe berries, used in making—

**Syrupus Rhamni.**

| | |
|---|---|
| Buckthorn Juice | 4 pints |
| Ginger, sliced | ¾ ounce |
| Pimento, bruised | ¾ ounce |
| Refined Sugar | 5 lbs. |
| Rectified Spirit | 6 fluid ounces |

Dose—1 drachm. Sp. gr. 1·320.

## FRANGULÆ CORTEX, Alder Bark.

—The bark from the trunk and larger branches of ***Rhamnus frangula***, growing in England and imported from Germany.

**Botanical Source.**—The *R. frangula* is distinguished from the *R. cathartica* by being more tree-like in habit, having larger leaves, which are entire and have 7 pairs of prominent veins, and by the fruit only having 2 or at most 3 *flat* seeds.

**Description.**—The bark is greyish externally, and brownish yellow internally, smooth, compact, and fibrous, with a sweetish taste.

**Uses.**—A purgative, official in Germany, and esteemed for its combined certainty and mildness. The best preparation is a watery fluid extract 1 in 1.

## NATURAL ORDER.—AMYRIDACEÆ.

[BURSERACEÆ.]

**OLIBANUM, Frankincense.**—The gum resin obtained by incision and exudation from the stem of various species of Boswellia. Really produced in Africa and Southern Arabia, but imported *via* India.

**Description.**—Usually in pale yellowish or nearly colourless distinct pear-shaped tears, but sometimes stalactiform and slightly agglutinated. Always covered externally by a fine white dust, and even where that is wiped off the tears appear translucent and milky, and have a characteristic turpentine-like odour. When rubbed with water it forms a white emulsion.

**Uses.**—Supposed to be the *Frankincense* of the Bible, and still used for burning in the Romish and Greek churches.

**Chemistry.**—*Olibanum* contains about 5 to 7 per cent. of volatile oil, 33 per cent. of gum identical with *arabin*, and the remainder a resin, $C_{40}H_{30}O_6$, which is not soluble in alkalies.

**ELEMI.**—A concrete resinous exudation probably from *Canarium commune*, chiefly imported from Manilla.

**Description.**—A soft adhesive and unctuous mass, becoming resinous by age. Its colour is yellowish white, and it has a fragrant odour resembling that of fennel. It should be almost entirely soluble in rectified spirit.

**Uses.**—*Elemi* is seldom used in British medicine, except in the form of an ointment sometimes prescribed as a stimulating application to old wounds.

**Chemistry.**—*Elemi* contains 10 per cent. of a fragrant colourless neutral volatile oil, 60 per cent. of an uncrystallisable resin soluble in cold alcohol, and 25 per cent. of a crystallisable resin, called amyrin, insoluble in cold alcohol.

**Specially Distinctive Tests.**—1. Soluble in chloroform and ether, the latter solution not being rendered turbid by alcohol.

2. Only partially soluble in alcohol, and the filtered solution is not precipitated by alcoholic plumbic acetate (1 in 10).

3. A portion of the alcoholic solution evaporated leaves a residue insoluble in boiling sodium carbonate.

4. The alcoholic and chloroform solutions are coloured violet respectively by alcohol saturated with dry hydrochloric acid gas, and by bromine in chloroform (1 in 20).

**Unguentum Elemi.**

| | |
|---|---|
| Elemi | ¼ ounce |
| Simple Ointment | 1 ounce |

**MYRRHA, Myrrh.**—A gum-resinous exudation from the stem of *Balsamodendron Myrrha*, collected in Arabia Felix and Abyssinia.

**Botanical Source.**—The *B. Myrrha* is a spiny shrub with ternate leaves and nearly sessile flowers.

**Collection.**—Myrrh, when first exuded, is said to be of an oily, then of a buttery appearance, yellowish white, gradually assuming a golden tint, and becoming reddish as it hardens.

There are two well-known commercial varieties. 1. Turkey, the finer kind, is of two qualities—(*a*) picked myrrh, in large pieces; and (*b*) grain myrrh. 2. East Indian myrrh (*Bissa Böl*); this is an inferior quality and much adulterated. Hanbury states that there are certainly three varieties of myrrh, which may well be derived from as many distinct species of myrrh-tree. He leaves the subject open to further elucidation.

**Description.**—Good commercial myrrh is in irregularly shaped masses of a reddish-brown colour, and slightly translucent. It has a dull irregular fracture, and an aromatic and characteristic odour.

**Uses.**—Tonic and stimulant. It acts upon the mucous membrane; applied locally it is a mild astringent. The tincture when diluted forms a useful gargle in relaxed throats. Dose of powder, 10 to 30 grains.

**Chemistry.**—Myrrh contains 2·5 per cent. of volatile oil, 40 to 50 per cent. of gum, and the remainder resin. Both the resin and gum contain two modifications, soft and hard. Soft resin, supposed to be a mixture of hard resin and volatile oil, has a strong odour, becomes softened by moderate heat, and is insoluble in ether. Hard resin has no odour, is not so readily softened, is insoluble in ether, and soluble in caustic alkalies, forming myrrhates. The first modification of the gum, probably arabin, is soluble in water, forming precipitates with salts of silver, mercury, and lead. The second modification is insoluble in water, and similar to bassorin. The volatile oil is soluble in alcohol, ether, and fixed oils.

**Specially Distinctive Tests.**—Ordinary myrrh is

1. Imperfectly attacked both by chloroform and ether.

2. Alcoholic solution gives a turbid mixture with ammonium hydrate, and no precipitate with alcoholic ferric chloride (1 in 10).

3. Not completely soluble in ether-alcohol.

4. Contains no sulphur, and yields no umbelliferone by dry distillation.

5. A little of the solid extract from alcohol solution is not coloured by a saturated solution of chlorinated lime.

6. The alcoholic solution is precipitated by alcoholic plumbic acetate.

7. The evaporated residue from a solution in petroleum spirit is coloured violet by impure chloral hydrate.

East Indian myrrh does not give the reactions 6 and 7.

**Tinctura Myrrhæ.**

| | |
|---|---|
| Myrrh, in coarse powder ............... | 2½ ounces |
| Rectified Spirit ......................ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

Dose—½ to 1 drachm (7 grains of Myrrh in 1 fluid drachm).

Myrrh is also contained in Decoctum Aloes Compositum, 3 grains to 1 fluid ounce; Mistura Ferri Composita, 6 grains to 1 fluid ounce; Pilula Aloes et Myrrhæ, 1 in 6; Pilula Asafœtidæ Composita, 1 in 3½; Pilula Rhei Composita, 1 in 8 nearly.

**Adulterations.**—Various gums and resins which may be distinguished by the transparency of their fractured surfaces and want of taste and odour. Also inferior kinds derived from other species of Balsamodendron, as *B. pubescens* and *B. Mukul*, which are the source of Bdellium or false myrrh, and are imported from Africa and the East Indies. Good myrrh should form a nearly white emulsion with water.

**BDELLIUM.**—A gum resin yielded by *Balsamodendron Mukul* and *B. pubescens*. Both species indigenous to Scinde.

**Description.**—In rounded pieces, of dull dark red colour; taste bitter and slightly acrid. Used as a substitute for Myrrh.

**Specially Distinctive Tests.**—*Indian Bdellium* behaves like myrrh as far as reactions 1, 2, and 3 already noticed.

4. It contains sulphur, detected by fusion with nitre and treating with barium chloride, but yields no umbelliferone.

5. It forms with saturated solution of sodium carbonate an emulsion which cannot be filtered.

6. The tincture is either not affected at all by alcoholic plumbic acetate, or yields a precipitate which disappears on warming.

## NATURAL ORDER.—ANACARDIACEÆ.

**MASTICHE, Mastich.**—A resinous exudation obtained by incision from the stem of *Pistacia Lentiscus,* produced in the island of Scio.

**Botanical Source.**—The *P. Lentiscus* is an evergreen diœcious shrub.

**Collection.**—Numerous vertical incisions are made about the middle of June in the bark of the stems and principal branches, from which the resin speedily flows, and soon hardens and dries; after 15 or 20 days it is carefully collected in baskets lined with paper or clean cotton wool.

**Description.**—Mastich is in smooth yellowish brittle tears, somewhat spherical; irregular, and covered with a dusty powder. It is entirely soluble in ether and oil of cloves, and about 90 per cent. is soluble in alcohol, the remainder being only soluble in ether and turpentine.

**Uses.**—Solutions of Mastich in ether and chloroform are used for stopping teeth and coating pills. Dissolved in turpentine or alcohol it forms a good common varnish.

**Chemistry.**—Mastich contains 90 per cent. of resin ($C_{20}H_{32}O_{2}$), which is soluble in alcohol, and 10 per cent. of Masticin, which is insoluble in alcohol. It also contains a very little volatile oil.

***Masticin*** is a translucent colourless tough substance, insoluble in boiling alcohol or in caustic alkalies, but soluble in ether and turpentine.

Among other interesting plants of the Anacardiaceæ, may be noted—

| | | | |
|---|---|---|---|
| *Pistacia Terebinthus*, | which | yields | Chian Turpentine. |
| *Pistacia vera*, | „ | „ | the Pistacia Nut. |
| *Anacardium occidentale*, | „ | „ | the Cashew Nut. |
| *Mangofera Indica*, | „ | „ | the Mango Fruit. |

**Specially Distinctive Tests.**—Ordinary Mastich is—1. Entirely soluble in chloroform and ether, and the latter solution is rendered turbid by alcohol.

2. The alcoholic solution gives no turbidity with saturated solution of ferric chloride.

3. It is only partially soluble in petroleum spirit, boiling below 100° F., and the mixture is coloured reddish violet by a saturated solution of iodine in petroleum spirit, boiling at 140° F.

*Bombay Mastich* is—1. Soluble in chloroform and ether, and an addition of alcohol to the latter solution causes no turbidity.

2. It is perfectly soluble in alcohol, and the solution is coloured greenish brown by an alcoholic solution of ferric chloride (1 in 10).

3. An alcoholic solution gives a precipitate with a saturated alcoholic solution of plumbic acetate, which is not re-dissolved by boiling.

4. It is not soluble in saturated solution of sodium carbonate.

5. The petroleum spirit solution leaves, on evaporation, a colourless extract, in which impure chloral hydrate (containing alcoholate) gives no decided colour.

*Alexandrian Mastich* behaves like Bombay, except that the plumbic acetate precipitate dissolves by boiling, and the solution is not coloured by the addition of solution of bromine in chloroform (1 in 20).

## NATURAL ORDER.—LEGUMINOSÆ

[*Or* FABACEÆ].

Herbs, shrubs, or trees, with usually compound, stipulate and alternate leaves; calyx monosepalous, 5 parted, persistent and inferior, odd sepal anterior; corolla (in British plants), 5 petals irregular, with odd petal posterior; stamens definite monadelphous or diadelphous; pistil, simple and superior; fruit, a legume or lomentum (rarely a drupe); seeds, exalbuminous.

The order is divided in 3 sub-orders—

1. *Papilionaceæ*, with truly papilionaceous corolla.

2. *Cæsalpinieæ*, corolla not truly papilionaceous.

3. *Mimoseæ*, with valvate æstivation and indefinite distinct stamens.

### SUB-ORDER I.—PAPILIONACEÆ.

**SCOPARII CACUMINA, Broom Tops.** —The dried tops of *Sarothamnus Scoparius*, cut from indigenous plants.

**Botanical Source.**—The common Broom is a shrub, with straight, glabrous, and angular branches. The leaves are ternate and very small, while the flowers are axillary and bright yellow, with the corolla papilionaceous, the stamens monadelphous, and the legume hairy, becoming blackish when ripe.

**Collection.**—The young first year's branches, which shoot up almost devoid of leaves, or with only a minute ovate and sessile leaflet, are cut, and either used at once for pressing out the juice, or dried for preservation.

**Uses.**—Chiefly administered as a diuretic in dropsy.

**Chemistry.**—The tops contain a neutral gelatinous or sometimes yellow crystalline body, called Scoparin, $C_{21}H_{22}O_{10}$, which remains, when a decoction is evaporated, until it solidifies on cooling, and the resulting gelatinous mass is well washed with cold water acidulated with hydrochloric acid. These acid liquors when distilled with sodium hydrate, and the product rectified by solution in acid and re-distillation with alkali, yield an oily volatile alkaloid, called Sparteia, $C_{15}H_{26}N_2$, sparingly soluble in water and boiling at 550° F. which forms crystalline salts with acids.

### Decoctum Scoparii.

| | |
|---|---|
| Broom Tops, dried | 1 ounce |
| Distilled Water | 20 fluid ounces |

Boil 10 minutes in a covered vessel, strain and make up product to 20 fluid ounces.

Dose—2 to 4 ounces.

### Succus Scoparii.

| | |
|---|---|
| Broom Juice | 3 pints |
| Rectified Spirit | 1 pint |

Filter after standing 7 days.

Dose—1 drachm to 2 drachms (1 fluid drachm is equal to 4 drachms of broom tops).

## FŒNI-GRÆCI SEMINA, Fenugreek.

—The seeds of *Trigonella Fænum-græcum* from Southern Europe.

**Botanical Source.**—This plant is an annual herb with whitish flowers, indigenous to the Mediterranean coasts.

No proper investigation has been made of fenugreek seeds, which are only used in veterinary practice; in curry powder, and cattle foods.

## TRAGACANTHA, Gum Tragacanth.

A gummy exudation from the stem of *Astragalus verus* and other species collected in Asia Minor.

**Botanical Source.**—The various species of *Astragalus* are low shrubs, having pinnate leaves with linear and hispid leaflets and curious strong and spiny petioles. The flowers are papilionaceous and yellow.

**Collection.**—Formerly it was only the gum which exuded spontaneously that was collected, but now incisions are made near the root, and the gum flows out and dries in the fine white flakes so highly prized in the market.

**Description.**—Good Tragacanth is in thin flakes, dull white and translucent, and having peculiar wavy marks on their surface. It should be horny, flexible and not easily fractured, and the surface should not be shiny. When dried at 120° F. it loses 14 per cent. of water, and may then be powdered.

**Uses.**—As a suspender of heavy insoluble powders in water, and as a pill excipient.

**Chemistry.**—Placed in water tragacanth swells and absorbs 50 times its own weight, forming a clear jelly. If now 50 parts more water be added and the whole stirred and filtered it is found that a portion is soluble while the remainder remains as an insoluble jelly, rapidly drying to a very coherent mass. The soluble gum is like *arabin*, inasmuch as it is precipitated by alcohol and ammonium oxalate, but it differs in being precipitated by normal plumbic acetate and not by borax or ferric chloride. The insoluble gum is called *Bassorin*, $C_{12}H_{20}O_{10}$, and is associated in the tragacanth with a little starch. Good samples should not yield more than 3 per cent. of ash.

**Mucilago Tragacanthæ.**

| | |
|---|---|
| Tragacanth | 60 grains |
| Distilled Water | 10 fluid ounces |

**Pulvis Tragacanthæ Compositus.**

| | | |
|---|---|---|
| Tragacanth, in powder | | 1 ounce |
| Gum Acacia | do. | 1 ounce |
| Starch | do. | 1 ounce |
| Refined Sugar | do. | 3 ounces |

DOSE—20 grains to 1 drachm.

Tragacanth also enters into the composition of Confectio Opii, 1 in 120, nearly; Pulvis Opii Compositus, 1 in 30.

**Adulterations.**—*Moussul gum*, or "hog tragacanth," is known by its much darker colour. Caramania Gum and Lead Carbonate are both found as commercial falsifications.

**GLYCYRRHIZÆ RADIX, Liquorice Root.**—The dried (and fresh) underground stem and root of *Glycyrrhiza glabra*. Cultivated in England.

**Botanical Source.**—The *G. glabra* is a herb with a perennial root stock and compound imparipinnate leaves, usually having 1—3 oval leaflets. The inflorescence is an axillary raceme of pale blue flowers, having papilionaceous corolla and diadelphous stamens.

**Collection.**—The plant which is chiefly cultivated in Mitcham and in Yorkshire, is allowed to grow for four years before being touched, and the roots are then dug up after the aerial stems die off in late autumn or early winter.

**Description.**—The dried root sometimes occurs in long cylindrical branched pieces, but is usually found in pieces about 4 inches long and as thick as a finger: it is tough and stringy, dirty brown externally, and yellow internally. It gives with water a solution precipitated by sulphuric acid.

**Uses.**—The powdered root is used to dust pills with to keep them from adhering together. It is also an excellent pill excipient for soft or liquid bodies, such as oleo-resins, acting by giving consistence. It may be employed with advantage to cover the taste of aloes and other nauseous drugs.

**Chemistry.**—Liquorice root contains a peculiar sweetish principle, called *glycyrrhizin*, $C_{24}H_{36}O_9$, sugar, asparagin, starch, albumen, malates and phosphates of lime and a little acrid oily matter. *Glycyrrhizin* is precipitated from a strong decoction upon the addition of an acid, or solution of acid tartrate of potassium, or normal or basic acetate of lead. It is a yellowish powder having an acid re-action and a strong sweetish-bitter taste. By boiling with a dilute acid it is resolved into a resinous amorphous bitter substance called *Glycyrretin*, the formula of which has not been settled, and an uncrystallisable sugar having the characters of glucose.

The root should be decorticated before use, as the cortical portion contains a somewhat acrid matter.

**Extractum Glycyrrhizæ.**

| | |
|---|---|
| Liquorice Root, in coarse powder ...... | 16 ounces |
| Distilled Water ...................... | 4 pints |

**Extractum Glycyrrhizæ Liquidum.**

Macerate 16 ounces of the root in 2 pints of water for 12 hours, strain and press. Repeat this process with another 2 pints of water. Mix the liquors, heat to 212° F., strain and evaporate to a density of 1·160. Finally add 1-8th of its bulk of rectified spirit, let it stand for 12 hours and filter.

**Pulvis Glycyrrhizæ Compositus.**

| | |
|---|---|
| Senna, in fine powder | 2 ounces |
| Liquorice Root, in fine powder | 2 ounces |
| Refined Sugar, in powder | 6 ounces |

Mix thoroughly, pass through a fine sieve, and finally rub it lightly in a mortar.

DOSE—30 to 60 grains.

Liquorice root is also an ingredient in Confectio Terebinthinæ, Decoctum Sarsæ Compositum, Infusum Lini, Pilula Hydrargyri, and Pilula Ferri Iodidi.

The extract enters into the composition of Decoctum Aloes Compositum, Confectio Sennæ, Mistura Sennæ Composita, Tinctura Aloes, and Trochisci Opii.

The *Spanish Juice* of commerce is an extract made by boiling the crushed fresh root with water in copper vessels and evaporating to a proper consistence, when it is rolled into sticks with the hands and stamped with the name of the maker.

The most famous is the "Solazzi" Juice, but there are several other varieties such as "Barracco," "Corigliano" and "Pignatelli."

INDIGO.—A blue pigment, prepared from various species of Indigofera.

**Botanical Source.**—This is chiefly *I. tinctoria*, a small shrubby plant, cultivated in Bengal and elsewhere in India.

**Collection.**—The plants are cut before flowering and placed in troughs covered with water. Fermentation sets in and is continued for 12 to 14 hours, until a sherry-coloured liquid is obtained, which on agitation in contact with air deposits the indigo as a precipitate. This latter is then filtered out, pressed, cut into cakes and dried.

**Uses.**—Solution of sulphate of Indigo is in the B.P. as a test for free chlorine, which bleaches the colour.

**Chemistry.**—The blue colouring matter is *Indigotin*, existing in ordinary commercial samples to the extent of 50 to 60 per cent. Its formula is $C_8H_5NO$, and it is thus metameric with *benzoyl cyanide*, $C_7H_5O.CN$. It fuses at 550°, and sublimes in prisms, and it is entirely insoluble in water and all ordinary solvents. Digested with strong sulphuric acid it dissolves to form a deep blue liquid called *sulphindigotic acid* (commonly called sulphate of Indigo). When treated with reducing agents in the presence of alkalies (such as ferrous sulphate and lime) Indigo dissolves to a colourless solution, and if any article be dipped into this liquid and hung up in the air it becomes dyed blue, because the Indigo is re-deposited by oxidation.

SETÆ MUCUNÆ, Cowhage, *Cow-itch.* —The hairs from the legumes of *Mucuna pruriens* from the West Indies.

These hairs possess the property of penetrating the skin, and cause great itching. When mixed with treacle, Cowhage is used as a mechanical anthelmintic against thread and round worms. Its use is to be followed by castor oil.

PHYSOSTIGMATIS FABÆ, Calabar Beans, *Eseré Nut*, *Ordeal Bean.* — The seeds of *Physostigma venenosum*, from Western Africa.

Botanical Source.—The plant resembles the common "scarlet runner," but grows much higher and has a woody stem.

Description.—Oblong seeds about 1-1¼ inch long, and about ¾ inch broad, with a hard and rough but slightly polished testa of a dark chocolate-brown colour. At one edge they are nearly straight, but at the other they are arched. Running along the arched side is a deep furrow. At one end of this furrow is seen the *micropyle* as a slight V-shaped depression, and the *raphé* is also observed running up the middle of the furrow as a slightly raised line.

**Uses.**—Diminishes the action of the heart, and also induces paralysis through its action on the spinal cord. Locally applied it powerfully *contracts* the pupil of the eye, and is chiefly used by oculists in presbyopia. It has been recommended in tetanus, delirium tremens, and epilepsy, but it is a dangerously powerful drug. Dose of the powder, 1 to 4 grains. The best antidote is the hypodermic injection of 1-50th of a grain of sulphate of atropia (repeated, if necessary, at the end of two hours) and artificial respiration.

**Chemistry.**—The active principle is an alkaloid called *Physostigmia*, $C_{30}H_{21}N_3O_4$, which exists chiefly in the kernel. It is soluble in ether, chloroform, alcohol, benzol, acids, and very sparingly in water. Its solutions become red or sometimes intensely blue on exposure to the air, a partial decomposition of the alkaloid taking place. It also becomes red on heating, *per se*, to 212° F. The kernels yield to boiling ether ·5 per cent. of fatty oil. They also contain 23 per cent. of legumin, 48 per cent. of starch, some mucilage, and a little sugar.

**Extractum Physostigmatis.**

| | |
|---|---|
| Calabar Bean, in coarse powder ........ | 16 ounces |
| Rectified Spirit........................ | 4 pints |

100 lbs. of beans yield about 2½ lbs. of extract.

Dose—1-16th to 1-4th grain.

**KINO, Kino,** *Gum Kino.*—The inspissated juice obtained from incisions made in the trunk of *Pterocarpus Marsupium.* Imported from Malabar.

**Botanical Source.**—The *P. Marsupium* is a tall tree.

**Collection.**—The juice is caused to exude through a long incision, and is collected in vessels at the foot of the tree. After a few hours' exposure to the sun and air it hardens, and is then packed in boxes.

**Description.**—In small, hard, brittle, reddish black fragments, glistening and translucent at the edges. It dissolves in the mouth with a very astringent taste and colours the saliva blood-red. It is entirely soluble in boiling water, but partially separates on cooling, leaving a red solution. It is almost entirely soluble in rectified spirit, but quite insoluble in ether.

**Uses.**—Astringent, but not so strong in that respect as catechu. Used in diarrhœa.

**Chemistry.**—Dilute acids cause in solutions a precipitate of *Kino-tannic Acid*, to which the astringency of Kino is due. An excellent test for its presence is to shake up a solution with *Ferrum redactum*, when a beautiful violet colour is produced. The colouring matter of the juice is called *Kino red.*

**Pulvis Kino Compositus.**

| | |
|---|---|
| Powdered Kino ...................... | 3¾ ounces |
| „ Opium ...................... | ¼ ounce |
| „ Cinnamon .................. | 1 ounce |

Dose—5 to 20 grains (3¾ in 5).

**Tinctura Kino.**

| | |
|---|---|
| Kino, in coarse powder ................ | 2 ounces |
| Rectified Spirit ....................ad. | 20 fluid ounces |

Macerate 7 days and filter.

Dose—½ to 2 drachms (5½ grains of Kino in 1 fluid drachm).

Also an ingredient in Pulvis Catechu Compositus, 1 in 5.

**Substitutions.**—1. Gambia Kino from *Pterocarpus erinaceus* from Western Africa.

2. Butea gum, or Bengal Kino, from *Butea frondosa.* Used in India in preference to ordinary Kino, and containing 74 per cent. of tannic acid.

3. Botany Bay Kino, the produce of several species of *Eucalyptus* from Australia. This is often imported in a semi-fluid state.

**PTEROCARPI LIGNUM, Red Santal Wood,** ***Red Sanders Wood.***—The wood of *Pterocarpus santalinus*, imported from Ceylon.

**Botanical Source.**—The *P. santalinus* is a small tree, a native of Southern India.

**Description.**—In heavy dark red billets, or in chips having the darker colour in streaks.

**Uses.**—Feebly astringent, but is only employed in pharmacy as a colouring for Compound Tincture of Lavender. It has numerous uses in the arts.

**Chemistry.**—The red colouring matter appears to be a resinoid substance, and is termed santalic acid or *santalin*, $C_{15}H_{14}O_5$. It is insoluble in water, turpentine and fixed oils, but soluble in alcohol, ether and acetic acid. Santalic acid will neutralise alkalies, and form with them uncrystallisable salts.

**BALSAMUM TOLUTANUM, Balsam of Tolu.**—A balsam obtained by exudation after incision into the bark of *Myroxylon Toluifera*. Imported from New Granada.

**Botanical Source.**—The *M. Toluifera* is a lofty evergreen tree, sometimes rising to a height of 40 feet before branching.

**Collection.**—The balsam is obtained by cutting several V-shaped notches into the bark, at the base of which the wood is a little hollowed out, so as to allow calabashes of the size and shape of tea-cups to be fixed. Sometimes as many as twenty calabashes may be seen on various parts of the same trunk, and the *bleeding* is allowed to go on for eight months in the year; so that ultimately the trees become much exhausted and thin in foliage.

**Uses.**—Stimulant and expectorant. Used in asthma and chronic diseases of the mucous membranes.

Dose, 10 to 20 grains.

**Chemistry.**—The balsam yields an amorphous resin, apparently identical with that of Balsam of Peru. It also contains a large portion of cinnamic acid, $HC_9H_7O_2$, together with 1 per cent. of tolene $C_{10}H_{16}$, a volatile oil, obtained by distilling the balsam with water.

By destructive distillation, it yields the same compounds as Balsam of Peru, under similar treatment, and also a little phenol and styrol.

The presence of cinnamic acid may be proved by heating with potassium dichromate and sulphuric acid, when *benzoic aldehyd* (oil of bitter almonds) will be given off.

**Specially Distinctive Tests.**—1. Completely soluble in chloroform and alcohol, but only imperfectly in ether.

2. Exhausted with petroleum spirit and the solution evaporated, a residue is obtained which is not distinctly coloured by sulphuric acid.

3. Yields much benzoic aldehyd when heated with potassium dichromate and sulphuric acid.

### Syrupus Tolutanus.

| | |
|---|---|
| Balsam of Tolu ...................... | 1¼ ounce |
| Refined Sugar ........................ | 32 ounces |
| Distilled Water.................q.s. or | 20 fluid ounces |

Product, 48 ounces by weight, or 36 fluid ounces by measure, sp. gr. 1·330.

Dose—I drachm.

### Tinctura Tolutana.

| | |
|---|---|
| Balsam of Tolu ...................... | 2½ ounces |
| Rectified Spirit ....................ad. | 20 fluid ounces |

Dissolve and filter.

Dose—20 to 40 minims (1 grain of Balsam of Tolu in 9 minims.)

This tincture is used to flavour the Trochisci of Tannin, Morphia, Morphia and Ipecacuanha, and of Opium.

It is also an ingredient in Tinctura Benzoini Composita, 1 in 40.

## BALSAMUM PERUVIANUM,

**Balsam of Peru.**—A balsam exuding from the trunk of *Myroxylon Pereiræ* after the bark has been scorched and removed. Imported from the western part of the state of San Salvador, known as the *Balsam Coast*, in Central America,

**Botanical Source.**—The *M. Pereiræ* is a lofty tree, of an exceedingly handsome character.

**Collection.**—The bark is well bruised with the back of an axe, and it is then charred by means of torches. After the lapse of several days the charred bark falls off and linen rags are applied to the stem, which soak up the exuding balsam. When fully saturated, the rags are thrown into a boiler with water, when the balsam sinks to the bottom; the water is then decanted and the balsam poured into *tecomates* or gourds, ready for the market. It formerly came to Europe through Peru, and so obtained its name.

**Description.**—A reddish black liquid, sp. gr. 1·15, as thick as syrup, and having a balsamic odour. It is soluble in 5 parts of rectified spirit, and should not alter in volume when treated with water.

**Uses.**—Stimulant and expectorant. Dose 10 to 15 minims in emulsion with acacia or on sugar. Used also in the form of ointment with castor oil, as a dressing for bed sores and indolent ulcers.

**Chemistry.**—Contains about 60 per cent. of a body called *Cinnamein*, and 38 per cent. of a black amorphous resin. These two bodies may be separated by mixing some balsam with thrice its weight of carbon disulphide, when the former dissolves, while the latter precipitates. The carbon solution leaves, on evaporation, a brown thick liquid, volatile at 570° F., and having a sp. gr. of 1·1. This is the so-called *cinnamein*, which is really *benzyl cinnamate*, $C_7H_7C_9H_7O_2$, as may be proved by the fact of its conversion into benzoic and cinnamic acids by the action of caustic alkalies.

**Specially Distinctive Tests.**—Behaves exactly like Tolu balsam, except that the residue in test 2 is coloured yellow-brown, passing to violet by sulphuric acid.

## SUB-ORDER II.—CÆSALPINIEÆ.

**HÆMATOXYLI LIGNUM, Logwood.**—The sliced heart-wood of *Hæmatoxylon Campechianum*. Imported from Campeachy, Honduras and Jamaica.

**Botanical Source.**—The *H. Campechianum* is a spreading tree, indigenous to Central America, and naturalised in the West Indies.

**Collection.**—Trees about 10 years old are chosen for felling.

**Description.**—Usually in chips, of a reddish brown colour and greenish lustre, with a feeble odour and sweetish taste, colouring the saliva pink.

**Uses.**—Mild astringent, and useful in diarrhœa of young persons, in hæmorrhages, and as an injection in leucorrhœa; but its use requires caution. Its employment in the art of dyeing is far more important.

**Chemistry.**—The useful agent in logwood is the colouring matter called *Hæmatoxylin*, of which it yields 9 to 12 per cent. The formula of this body is $C_{16}H_{14}O_6$. It is colourless when pure, and soluble in hot water and alcohol, but sparingly in cold water and ether. Its solution becomes red on exposure to light, and violet on adding even a trace of alkali.

This change is due to the formation of *Hæmatein*, $CH_{16}H_{12}O_6 8H_2O$, and the colour may be destroyed by various reducing agents, like sulphurous acid, which re-form the original Hæmatoxylin. A further test for the presence of Hæmatoxylin is found in the fact that it forms pyrogallic acid when fused with potassium hydrate. It may also be precipitated by alum, plumbic acetate, ferric salts and gelatin, and it reduces Fehling's solution of copper.

### Decoctum Hæmatoxyli.

| | |
|---|---|
| Cinnamon, in coarse powder............ | 60 grains |
| Logwood, in chips .................... | 1 ounce |
| Distilled Water ...................... | 1 pint |

Boil 10 minutes, add cinnamon towards the end; make up the product to 20 fluid ounces.

*Incompatibles.*—Acids; lime water; and most metallic salts.

DOSE—1 to 2 ounces.

### Extractum Hæmatoxyli.

| | |
|---|---|
| Logwood, in fine chips ................ | 16 ounces |
| Boiling Distilled Water ................ | 1 gallon |

(100 lbs. of wood yield about 18 lbs. of Extract.)

DOSE—10 to 30 grains.

**Adulteration.**—Chips of Brazil wood (from various species of *Cæsalpinia*), a decoction of which turns *red* instead of *violet*, with alkalies. Oxidised by nitric acid, pure logwood solution will only yield oxalic acid, but if *Brasilin* be present, picric acid will also be formed.

**SENNA ALEXANDRINA, Alexandrian Senna.**—The leaflets of *Cassia acutifolia*, (*C. lanceolata* and *C. obovata* B.P.) carefully freed from the leaf-stalks, flowers and pods of the same. Imported from Alexandria.

**Botanical Source.**—The *C. acutifolia* is a shrub about 2 feet high, with paripinnate leaves and axillary racemes of yellow flowers.

**Collection.**—The plants are cut down in September, and sometimes also in April, and laid on rocks in the sun till dry. The leaflets are then carefully stripped off and packed in bags made from palm leaves.

**Description.**—Ovate or lanceolate, acute and mucronate (with *mucro* a sharp point or edge) leaflets, about ¾ to 1¼ inch long, and unequal at the base. They are conspicuously veined, and have often an incurved margin and a brown midrib. They are very finely pubescent, especially close to the midrib, and are greyish green in colour.

**Uses.**—Purgative, producing watery stools by acting on the small intestines. It is by some considered rather heating, and is apt to gripe and nauseate.

Dose, 30 to 120 grains.

**Chemistry.**—The chief principle is an uncrystallisable glucoside called *Cathartic acid*, $C_{180}H_{192}O_{82}N_4S$, which may be obtained by mixing a syrupy aqueous extract of senna with an equal volume of alcohol, and filtering out the mucilage thus thrown down, when the addition of a further quantity of alcohol throws down a dark substance, from which when treated with hydrochloric acid Cathartic acid is precipitated. It is almost insoluble in water and alcohol, but entirely soluble in ether and chloroform, and it dissolves in warm dilute alcohol. It is precipitated by most acids, but not by tannic. Cathartic acid when boiled with hydrochloric acid is resolved into glucose and *Cathartogenic acid.* Senna contains *Chrysophanic acid* and some tartaric and oxalic acids, with traces of malic acid, also a peculiar crystalline sugar, called *catharto-mannite*, which is insusceptible of fermentation.

**Confectio Sennæ** (*Lenitive Electuary*).

| | |
|---|---|
| Senna, in fine powder | 7 ounces |
| Coriander Fruit, in fine powder | 3 ounces |
| Figs | 12 ounces |
| Tamarinds | 9 ounces |
| Cassia Pulp | 9 ounces |
| Prunes | 6 ounces |
| Extract of Liquorice | ¾ ounce |
| Refined Sugar | 30 ounces |
| Distilled Water | 24 fluid ounces |

Product 75 ounces.

DOSE—1 to 2 drachms (6½ grains of Senna in 1 drachm).

### Infusum Sennæ.

| | |
|---|---|
| Senna | 1 ounce |
| Ginger, sliced | 30 grains |
| Boiling Distilled Water | 10 fluid ounces |

Infuse in a covered vessel for 1 hour, and strain.

*Incompatibles.*—Strong acids; lime water; and most metallic salts.

DOSE—I to 2 ounces.

### Mistura Sennæ Composita.

| | |
|---|---|
| Sulphate of Magnesia | 4 ounces |
| Extract of Liquorice | ½ ounce |
| Tincture of Senna | 2½ fluid ounces |
| Compound Tinct. of Cardamoms | 10 fluid ounces |
| Infusion of Senna ad. | 20 fluid ounces |

DOSE—1 to 1½ ounce (about 1 drachm of magnes. sulph. in 5 fluid drachms).

### Syrupus Sennæ.

| | |
|---|---|
| Senna, broken small | 16 ounces |
| Oil of Coriander | 3 minims |
| Refined Sugar | 24 ounces |
| Distilled Water q.s. or | 5 pints |
| Rectified Spirit | 2 fluid ounces |

Product, 42 ounces by weight, or 32 fluid ounces by measure; sp. gr. 1·310.

DOSE—1 to 4 drachms.

### Tinctura Sennæ.

| | |
|---|---|
| Senna, broken small | 2½ ounces |
| Raisins, freed from seeds | 2 ounces |
| Caraway Fruit, bruised | ½ ounce |
| Coriander Fruit, bruised | ½ ounce |
| Proof Spirit ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

DOSE—1 to 4 drachms (28 grains of senna, in ½ fluid ounce).

**Adulterations.**—1. The leaves of ***Cynanchum***, or ***Solenostemma Argel*** (Nat. Ord. Asclepiadaceæ), which are thicker than those of senna, equal at the base, and not distinctly veined. The small corymbs of white star-like flowers, and the slender pear-shaped follicles of the same plant may also be found.

2. The leaves of ***Coriaria myrtifolia***, which are ovate, acute, and unequal at the base, but have ***a distinct vein running up just inside each margin.***

3. The leaves of ***Tephrosia Apollinea***, which are obovate ***and not at all mucronate.***

SENNA INDICA, Tinnevelly Senna.—The leaves of ***Cassia angustifolia*** (*C. elongata* B.P.), from plants cultivated in Southern India.

**Description.**—Yellowish green leaflets, about 1 to 2 inches long, with an unequal base, and almost glabrous.

**Chemistry and Uses.**—The same as Alexandrian Senna; to which it is to be preferred, owing to its freedom from adulteration. It is said however not to be quite so active.

BOMBAY or MECCA SENNA, East Indian Senna.—The produce of *wild* plants of

*C. angustifolia*, collected in Arabia, and exported to Bombay and from thence to Europe.

**Description.**—Of the most inferior description, consisting of brown and broken leaflets with many stalks, flowers, and pods.

**CASSIÆ FISTULÆ FRUCTUS, Purging Cassia.**—The indehiscent lomentum of *Cassia Fistula*, imported from the East and West Indies.

**Botanical Source.**—This plant is a tree growing 30 feet high, with pendulous racemes of yellow flowers, originally indigenous in the East Indies, but cultivated in the West Indies and in Brazil.

**Description.**—Long narrow cylindrical pods about ¾ to 1 inch in diameter, having the ventral and dorsal sutures distinctly marked, and when curved with the ventral suture inside. The interior of the pod is divided into a number of small divisions, by means of *spurious dissepiments*, and in each division is an oval, flat reddish brown seed with a shiny testa and a well-marked *raphé* as a dark line on one side. The seeds are embedded in a black sweetish pulp usually partially dried up in the imported pod.

**Chemistry.**—The pulp contains sugar, gum, pectin, and a cathartic principle.

*Cassiæ Pulpa* (Cassia Pulp).—The pulp of the fruit separated from the pods. It is an ingredient in *Confectio Sennæ* (1 in 8¼ nearly).

**CASSIÆ GRANDIS FRUCTUS, Horse Cassia.**—The lomentum of C. *grandis or C. Brasiliana*, from Central America. The pulp of this fruit is much used in veterinary practice. It is a very much larger fruit, and the pulp is bitter and astringent.

**TAMARINDUS, Tamarind.** — The preserved pulp of the ripe fruit of *Tamarindus Indica* chiefly imported from the West Indies.

**Botanical Source.**—A large tree with compound pinnate leaves, and having indehiscent legumes.

**Description.**—The fruit is an oblong legume from 3 to 6 inches long, and with 4 to 12 seeds. It consists of a hard and brittle epicarp, a pulpy mesocarp, and a tough membranous endocarp surrounding each seed like a cell. On the surface of the pulp run very characteristic strong fibres.

**Collection.**—The fruit is plucked when fully ripe from June till August, and the outer shell having been broken and stripped off, the pulp and seeds are placed in layers in a cask with a sprinkling of raw sugar between. When the cask is sufficiently packed, boiling syrup is poured over, and when cold the whole is closed up for export. This is the process for preserving the *brown* or *West Indian tamarinds* which are used in this country; but the *black* or *East Indian tamarinds*, more generally employed on the Continent, are packed without sugar.

**Uses.**—Mildly laxative; used for making a refrigerant drink in fevers. The cotyledons of the seeds, which have a bland mucilaginous taste, serve in India as a food during times of scarcity.

**Chemistry.**—Unsweetened tamarind pulp contains 34·35 parts of large-celled parenchyma, 27·55 per cent. of water, 9·4 per cent. of citric acid, 1·55 per cent. of tartaric acid, 0·45 per cent. of malic acid, 3·25 per cent. of acid tartrate of potash, 4·7 per cent. of gum, 6·25 per cent. of pectin, and 12·5 per cent. of sugar; but as sugar is added to preserve the West Indian pulp, it will be found to contain twice as much sugar, and proportionately less of the other ingredients. The testa of the seed contains a large quantity of tannin. A piece of bright iron left in contact with the pulp for about an hour should not exhibit any deposit of copper, with which the tamarinds are sometimes contaminated through being placed in copper vessels.

**Preparation.**—An ingredient in Confectio Sennæ.

**COPAIBA, Copaiva.**—The oleo-resin obtained from incisions made in the trunk of *Copaifera multijuga* and other species of Copaifera, chiefly from the valley of the Amazon. Its true botanical origin is doubtful, and its orthography is not definite.

**Collection.**—A large wedge-shaped notch is cut right into the heart of the tree near its base, and from this the balsam flows and is collected.

**Description.**—An oily thick liquid varying in colour from deep brownish to pale amber, and in sp. gr. from ·94 to ·99. It has a characteristic odour, and should not become gelatinous after heating to 270° F. Copaiva should be soluble in its own weight of benzol.

**Uses.**—Acts specially on the mucous membranes of the urinary organs and the rectum. Employed as a specific in gonorrhœa and also in hæmorrhoids. The dose of the oleo-resin is from ½ to 1 drachm. As usually administered the balsam is enclosed in gelatin capsules, but it is also made into an emulsion with mucilage or alkalies, or into pills by means of an equal weight of magnesium carbonate.

The dose of the oil is from 5 to 20 minims.

**Chemistry.**—40 to 60 per cent. of a volatile oil, $C_{10}H_{16}$, isomeric with turpentine, holding in solution an acid resin called *copaivic acid*, $C_{20}H_{32}O_2$. By distilling the copaiba with water the oil passes over and the resin remains as a brittle mass.

**Specially Distinctive Tests.**—All varieties of this substance are—1. Completely soluble in chloroform and entirely soluble in ether, the latter solution becoming turbid on the addition of alcohol.

2. An alcoholic solution gives no turbidity with an alcoholic solution of ferric chloride (1 in 10).

3. Entirely soluble in petroleum spirit boiling below 100° F.

After applying these general tests, Maranham and Para balsam may be distinguished from each other by dissolving in chloroform and adding a solution of bromine in chloroform (1 in 20), which colours the former bluish but does not affect the latter.

**Varieties and Adulteration.**—The two chief varieties are *Maranham* and *Para*, the latter being usually a very fluid and light-coloured balsam. An inferior dark balsam is imported from Maracaibo. The most common adulteration is castor and other fixed oils. These may be most certainly detected and estimated by the process introduced by the present author. It consists in saponifying balsam with alcoholic soda, adding water and evaporating until the alcohol is expelled, then *exactly neutralising* the solution by a dilute acid and evaporating to dryness. The dry neutral soap is then treated with a mixture of 1 part of absolute alcohol and 5 parts of absolute ether, in which the copaiba soap dissolves easily, leaving any oil soap insoluble. The latter (if any) is then dissolved in water and boiled with excess of hydrochloric acid, which causes the fatty acids to separate and float on the surface, when they may be collected and weighed.*

A more rough and rapid way consists in simply boiling the copaiba with water until the volatile oil is expelled, and then letting the resin cool, when, if any fixed oil be present, it will make the resin soft or even remain floating in oily drops.

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* For full particulars see "THE ANALYST," vol. i., p. 160.

Another method is to heat the copaiba with 4 parts of rectified spirit and letting it cool, when it separates into two layers, and the upper will contain any castor oil which may be recovered by evaporation, and tested for and heating with soda lime (see Castor Oil).

The non-coagulation after heating to 270° F. proves the absence of *Gurjun Balsam*, for which see p. 71.

**COPAIBÆ OLEUM.**—Obtained by distilling *Copaiba* with water. A volatile oil, sp. gr. ·88 to ·9, colourless or pale yellow. Miscible with ether, and soluble in 8 parts of rectified spirit. It boils at 475° F., and is a solvent of sulphur, phosphorus, and iodine.

## SUB-ORDER III.—MIMOSEÆ.

**GUMMI ACACIÆ, Gum Arabic.**—A gummy exudation from the stems of one or more species of *Acacia*. Imported from Alexandria and elsewhere.

**Botanical Source.**—The plant which produces the finest or *Kordofan* gum, is the *Acacia Verek*, a small tree growing in Eastern Africa, while the inferior sorts are produced by other species.

**Varieties.**—1. *Kordofan*, or "picked Turkey Gum."—This is the finest colourless gum, in lumps of varying sizes and full of minute cracks. Sp. gr. 1·487, and if dried at 212° F. 1·525.

2. *Senegal Gum.*—Is in yellowish lumps, not having the minute cracks of the fine acacia. Imported from the French settlements in Senegal.

3. *Suakin or Talca Gum.*—Imported from Alexandria in very small fragments of colourless gum, mixed with many pieces of a deep red-brown colour. Usually known in the trade as Acacia "sorts."

Besides these there are inferior brown gums imported from Morocco, Bombay, Australia (*Wattle gum*), and the Cape of Good Hope.

**Uses.**—Topically emollient and demulcent. Employed to suspend heavy powders, and to emulsify resins.

**Chemistry.**—Gum Arabic forms with 2 parts of water a mucilage having a sp. gr. of 1·149. It is slightly soluble in dilute spirit, but quite insoluble in spirit, containing an amount of alcohol over 60 per cent. Its aqueous solution is not precipitated by normal plumbic acetate, but with *basic* plumbic acetate it forms a white jelly. When boiled with diluted sulphuric acid it is converted first into dextrin and then into sugar; while nitric acid transforms it into mucic and oxalic acids. It may be regarded as a compound of *Arabic* acid or *Arabin*, $C_{12}H_{22}O_{11}$, with calcium and potassium, and the formula $CaK2C_{12}H_{22}O_{11}\cdot 6C_{12}H_{22}O_{11}$ has been assigned to it. The presence of calcium may be proved by adding ammonium oxalate to a solution, and *Arabic acid* may be isolated by the dialysis of a mucilage acidulated with hydrochloric acid, when the calcium and potassium will pass through as chlorides, leaving in the dialyser the *Arabic acid* which, when dried, is insoluble in water, but swells in it. Solutions of gum acacia are precipitated by borax and ferric salts.

**Mucilago Acaciæ.**

| | |
|---|---|
| Gum Acacia, in small pieces............. | 4 ounces |
| Distilled Water ......................... | 6 fluid ounces |

(Measures 8¾ ounces).

(3 drachms are required to emulsify 1 ounce of oil or resinous tinctures, and 8 drachms for 1 ounce of Copaiba.)

*Incompatibles.*—Rectified spirit; ferric salts; acetate of lead, mercuric nitrate.

Gum Arabic also enters into Mistura Cretæ (1 in 34); Mistura Guaiaci (1 in 85); Pulvis Amygdalæ Compositus (1 in 13); Pulvis Tragacanthæ Compositus (1 in 13); in all the Trochisci, and in the French preparation Sirop de Gomme.

**CATECHU NIGRUM, Black Catechu,** *Cutch.*—An aqueous extract of the heart wood of *Acacia Catechu.* Imported from Pegu.

**Botanical Source.**—The article of commerce is obtained from two trees, the *A. Catechu* and the *A. Suma*, both growing in Southern India and in the tropical parts of Eastern Africa.

**Collection.**—The wood is cut into chips and boiled with water in earthen pots. The liquor is evaporated to a semi-solid state, and then run into clay moulds to harden.

**Description.**—In blackish brown masses, having an irregular shining but somewhat granular fracture. Frequently having fragments of brown leaves attached to the outside.

**Uses.**—Similar to pale Catechu, but much more astringent. (See Cinchonaceæ.)

**Chemistry.**—Cutch is only slightly soluble in cold water, but dissolves on boiling and crystallises out again on cooling. The portion soluble in cold water is *Catechu-tannic acid*, having the properties of ordinary tannic acid; and the portion insoluble is *Catechin* or *Catechuic* acid, $C_{13}H_{12}O_5$, which may be extracted from Cutch by ether.

## NATURAL ORDER.—ROSACEÆ.

Trees, shrubs or herbs with alternate and usually stipulate leaves and regular flowers; calyx monosepalous and persistent; corolla rosaceous; stamens numerous and perigynous, with 2-celled innate anthers; pistil usually apocarpous and superior, sometimes becoming inferior in the fruit; fruit either a drupe, achænium, follicle, etærio, cynarrhodum or pome; seeds exalbuminous.

### SUB-ORDER I.—CHRYSOBALANEÆ.

Trees or shrubs with free stipules; style basilar; fruit a drupe.

## SUB-ORDER II.—AMYGDALEÆ.

Trees or shrubs, calyx deciduous; style terminal; fruit a drupe.

**AMYGDALÆ DULCES, Sweet Almonds.**—The seeds of *Amygdalus communis*, var. *dulcis*. Cultivated about Malaga.

**Botanical Source.**—The almond is a small tree with nearly sessile solitary flowers appearing before the leaves. It bears a drupe with a velvety mesocarp, which when ripe dries and splits off, leaving an oblong endocarp pitted with numerous holes, and containing the seeds, which are the almonds of commerce.

**Varieties.**—The finest are the Jordan almonds, from Malaga, easily known by their size and oblong form, and usually imported without the endocarp. The other qualities, in the order of their value, are those from Valencia, Sicily and Barbary, generally imported in their shells.

**Uses.**—To make Oleum Amygdalæ, and to suspend heavy powders in emulsion.

**Chemistry.**—Sweet almonds yield a fixed oil to the extent of 50 per cent. (see Ol. Amygd.) and also contain a nitrogenous body called *emulsin*, together with sugar and mucilage.

**Mistura Amygdalæ:**

| | |
|---|---|
| Compound Powder of Almonds ........ | 2½ ounces |
| Distilled Water ...................... | 20 fluid ounces |

Dose—1 to 2 ounces (54½ grains of powder in 1 fluid ounce).

**Pulvis Amygdalæ Compositus.**

| | |
|---|---|
| Sweet Almonds ...................... | 8 ounces |
| Refined Sugar ........................ | 4 ounces |
| Gum Acacia .......................... | 1 ounce |

**AMYGDALÆ AMARÆ, Bitter Almonds.**—The seeds of *Amygdalis communis*, var. *amara*, imported from Mogadore.

**Botanical Source.**—Already described.

**Description.**—Smaller than sweet almonds, bitter to the taste, and giving off when rubbed with water an odour of hydrocyanic acid. The best are the French the Sicilian and Barbary follow in order of value.

**Uses.**—Employed as a flavouring, and often with very deleterious effects.

**Chemistry.**—They yield by pressure 44 per cent. of fixed oil, and the residual cake when boiled with alcohol yields a solution containing *Amygdalin*, which crystallises and gives the formula $C_{20}H_{27}NO_{11}\cdot 2H_2O$. It is a neutral bitter inodorous glucoside, and rarely amounts to more than 2½ per cent. The residue from the alcohol if digested with water yields an albuminoid body called *emulsin*, which is precipitated by alcohol and rendered inert by boiling. It possesses the power of decomposing the amygdalin in presence of water, forming benzoic aldehyd (oil of bitter almonds), hydrocyanic acid, and glucose.

$$\underset{\text{Amygdalin.}}{C_{20}H_{27}NO_{11}} + \underset{\text{Water.}}{2H_2O} = \underset{\text{Oil of Bitter Almonds.}}{C_7H_6O} + \underset{\text{Hydrocyanic Acid.}}{HCN} + \underset{\text{Glucose.}}{2C_6H_{12}O_6}$$

**OLEUM AMYGDALÆ AMARÆ.—Essential Oil of Bitter Almonds** (*Benzoic aldehyd*) $C_7H_6O$, is prepared by making the residual bitter almond cake, after expression of the fixed oil, into an emulsion with cold water, letting it stand for 24 hours (for the emulsin to act on the amygdalin and develop the essential oil) and then distilling. The crude oil may be freed from hydrocyanic acid by agitating with a strong solution of sodium hydrosulphite, $NaHSO_3$, which combines with the benzoic aldehyd and forms a crystalline precipitate. On separating this, washing, and treating with sodium carbonate, the pure oil is obtained and is then freed from moisture by distillation over calcium chloride.

Another process is to agitate the crude oil with milk of lime and ferrous sulphate, and then distil. The purified oil is more liable to oxidation than the crude oil, and much more expensive. Bitter almond cake yields about 1 per cent. of the crude oil. Pure benzoic aldehyd (often expressed in books as benzoyl hydride, $C_7H_5O.H$) is colourless, with a sp. gr. of 1·049, and boils at 356° F. Exposed to the air it oxidises into a crystalline mass of benzoic acid, $HC_7H_5O_2$. The crude oil is yellow, soluble in alcohol and ether, and forms a red liquid with sulphuric acid, which when poured into water produces a yellow emulsion.

**Tests.**—All samples should be carefully tested for hydrocyanic acid, as fresh oil may contain from 8 to 14 per cent., although it becomes lessened in quantity by age. If present in good quantity it may be detected by the ordinary *iron* test, and estimated if necessary by shaking up the oil with water, then adding a slight excess of sodium hydrate, and running in volumetric solution of silver.

A sure and delicate test paper for the examination of substances suspected to contain hydrocyanic acid is made by dipping bibulous paper in fresh tincture of guaiacum, then drying and dipping in an aqueous solution of cupric sulphate (1 in 2000), and once more drying. The paper will become intensely blue if moistened and afterwards dipped into oil containing hydrocyanic acid.

## AMYGDALÆ OLEUM, Almond Oil.

—An oil obtained by expression from either bitter or sweet almonds.

**Description.**—A thin pale yellow oil, sp. gr. ·92, and not coagulable at 32° F. like olive oil, but remaining fluid until cooled to 12·5° F. It gets rancid in contact with the air, but does not dry.

**Uses.**—An ingredient in Unguentum Cetacei, Unguentum Hydrargyri Oxidi Rubri, Unguentum Plumbi Subacetatis Compositum, Unguentum Simplex, and all other ointments containing the latter as an ingredient. With lard and wax it produces much whiter ointments than *Oleum Olivæ.*

**Chemistry.**—Almond oil is nearly all pure *olein*, $C_3H_5 3C_{18}H_{33}O_2$.

**PRUNI FRUCTUS, Prunes.**—The dried fruit of ***Prunus domestica.*** Imported from France.

**Botanical Source.**—The *P. domestica* is a small tree, destitute of spines, and having usually ovate lanceolate leaves. The flowers are in axillary cymes, having a white rosaceous corolla, numerous perigynous stamens, and a superior simple ovary producing a drupe well known as the common black plum. The dried drupe is imported from Southern Europe.

**Varieties.**—The best prunes are those from Bordeaux, which are dried by alternating the heat of a stove with that of the sun.

**Uses.**—Nutritious, demulcent and mildly laxative, especially for children.

**Chemistry.**—The same as most of the ordinary edible fruits, containing sugar, pectin, gummy matter, malic acid and some calcium oxalate.

An ingredient in Confectio Sennæ.

**PRUNI VIRGINIANÆ CORTEX, Wild Black Cherry bark.**—The bark of ***Prunus serotina.*** Imported from North America.

**Uses.**—Of late this bark has been frequently prescribed in England; when obtained from the last-named plant it is official in the United States Pharmacopæia as "Cortex pruni serotinæ," being used as a sedative and tonic, and in heart disease.

**Chemistry.**—Emulsin and amygdalin, which when brought into contact with water yield Benzoic Aldehyd and Hydrocyanic Acid. The bark also contains tannic acid and bitter extractive.

**LAUROCERASI FOLIA, Cherry Laurel Leaves.**—The fresh leaves of *Prunus Laurocerasus*. A native of Asia Minor, but now cultivated in Britain.

**Botanical Source.**—This plant is an evergreen shrub, having oblong smooth coriaceous shining leaves, with slightly serrate margin and shortly petiolate. Inflorescence axillary racemes. Corolla white rosaceous and spreading; stamens indefinite, perigynous; fruit a black drupe, resembling a cherry.

**Uses.**—Sedative and narcotic. Employed in heart disease, but its use is generally superseded by that of the more definite Hydrocyanic Acid.

**Chemistry.**—The leaves yield by distillation a volatile oil, similar to that of bitter almonds, *i.e.*, Benzoic Aldehyd, containing Hydrocyanic Acid. This is probably developed in the leaves, by the action of bodies similar to Emulsin and Amygdalin, although the latter has not been obtained from them.

**Preparation.**—*Aqua Laurocerasi*, 1 lb. to 2½ pints, distil 1 pint. Dose—5 to 30 minims.

## SUB-ORDER III.—ROSEÆ.

Shrubs or herbs with compound leaves and adnate stipules, fruit, follicles, etærio, or cynarrhodum.

**CUSSO, Flores Koso,** *Kousso*.—The flowers and tops of *Hagenia Abyssinica* (*Brayera anthelmintica*, B.P.). Collected in Abyssinia.

**Botanical Source.**—This is a tree growing in the highlands of Abyssinia. The inflorescence is in panicles of unisexual flowers, and the plant is monœcious. The female inflorescences, which are chiefly collected, have the calyx 5 partite in two rows, the corolla being very minute. Two carpels with hairy styles are contained in the calyx tube.

**Description.**—A mass of brownish flowers on panicles 10 inches long, with hairy pedicels, the points of the female flowers already noticed being discernible with care. It has an odour like tea, and a bitter acrid taste.

**Uses.**—Anthelmintic, especially in tapeworm, but by some thought to be comparatively useless. Dose, ¼ to ½ ounce.

**Chemistry.**—Three per cent of ***koussin*** **($C_{31}H_{38}O_{10}$)**: 24 per cent of tannic acid; 6·5 per cent. of an acrid resin, gum, sugar and wax. Koussin may be extracted by mixing the flowers with lime, exhausting them first with alcohol, then with water, concentrating the mixed solution and adding acetic acid, by which it is precipitated. It is freely soluble in boiling alcohol, in ether, chloroform, and solutions of the caustic alkalies, from which it is precipitated by acids.

Infusum Cusso ½ ounce to 8 fluid ounces. To be taken unstrained.

**ROSÆ GALLICÆ PETALA, Rose Leaves.**—The fresh and dried unexpanded petals of ***Rosa Gallica***, from plants cultivated in Britain.

**Botanical Source.**—The ***R. Gallica*** is a dwarfish shrub covered with prickles and glandular hairs intermixed. Leaves compound imparipinnate, inflorescence axillary in a cluster, sepals ovate, leafy, compound; cynarrhodum oblong.

**Uses.**—Very slightly astringent and tonic, but chiefly used as a colouring matter. The acid infusion is given as a refrigerant drink in fevers, and as a vehicle for saline purgatives and gargles. The Confection is the excipient for the Pills of Aloes, Barbadoes Aloes and Assafœtida, Aloes and Iron, Aloes and Myrrh, Aloes Socotrina, Carbonate of Iron, Mercury, and Lead with Opium

**Chemistry.**—A slight trace of volatile oil, tannic and gallic acids, and a glucoside called *quercitrin* ($C_{33}H_{30}O_{17}H_2O$), a little fat, glucose and colouring matter. *Quercitrin,* when boiled with a dilute acid, yields glucose and *quercetin* ($C_{27}H_{18}O_{12}$).

The colouring matter is turned bright red by mineral or vegetable acids; green by alkalies. It is entirely bleached by strong sulphuric acid.

**Confectio Rosæ Gallicæ.**

| | |
|---|---|
| Fresh Red Rose Petals ................ | 16 ounces |
| Refined Sugar ....................... | 48 ounces |

### Infusum Rosæ Acidum.

| | |
|---|---|
| Dried Red Rose Petals, broken up ...... | ¼ ounce |
| Dilute Sulphuric Acid .................. | 60 minims |
| Boiling Distilled Water ................ | 10 fluid ounces |

Infuse ½ hour and strain.

*Incompatibles*—Alkalies; earths; and all substances which act on, or combine with sulphuric acid. Ferri sulph. gives it a brown colour.

Dose—1 to 2 ounces.

### Syrupus Rosæ Gallicæ.

| | |
|---|---|
| Dried Red Rose Petals ................. | 2 ounces |
| Refined Sugar ......................... | 30 ounces |
| Boiling Distilled Water ................ | 20 fluid ounces |

Product, 46 ounces by weight, or 35 fluid ounces by measure; sp. gr. 1·335.

Dose—1 drachm.

## ROSÆ CENTIFOLIÆ PETALA,

**Cabbage Rose Leaves.**—The fresh petals of *Rosa centifolia*, from plants cultivated in Britain.

**Botanical Source.**—A shrub closely covered with prickles and glandular hairs. Leaves compound imparipinnate, having ovate leaflets stipulate and hairy on the under surface. Inflorescence axillary in a drooping cluster; calyx divided in a pinnate manner but not reflexed; cynarrhodum ovate.

**Chemistry.**—The odour is due to the volatile oil which exists in the petals to about 0·04 per cent., and is the costly Attar or Otto of Roses. The petals also contain tannic, malic, and tartaric acids; resin, fat and sugar.

*Aqua Rosæ*, 10 lbs. to 2 gallons; distil 1 gallon.

Rose water enter into the composition of Mistura Ferri Composita and Trochisci Bismuthi.

OLEUM ROSÆ, *Attar or Otto of Roses.*—The chief supply of *Otto of Roses* comes from Turkey. It is distilled in copper stills from the fresh flowers. The first portion of the distillate is returned to the still; that afterwards obtained is set aside for a few hours in order that the oil may separate, when it is skimmed off by means of a small tin funnel. Turkish attar consists of about 18 per cent. of odourless *stearopten*, $C_{20}H_{40}$, and of an oxygenated hydro-carbon, which is the odoriferous constituent. It should be of a bright straw colour, having a sp. gr. of 0·87 to 0·89, and becoming solid at between 60° and 68° F.

Inferior oils distilled from French flowers contain sometimes as much as 60 per cent. of stearopten, and congeal at about 86° F.

## ROSÆ CANINÆ FRUCTUS, Hips.—

The ripe fruit of *Rosa canina* from indigenous plants.

**Botanical Source.**—A prickly plant with compound imparipinnate leaves, having adnate stipules. The calyx segments are pinnate and deciduous, the corolla rosaceous, and the fruit is apocarpous consisting of a number of achenes, enclosed in a red succulent tube produced by the union of the calyx tube and the thalamus; the whole forming an ovate cynarrhodum about an inch long.

**Chemistry.**—The pulp contains 3 per cent. of free citric acid, 7 per cent. of free malic acid, 25 per cent. of gum, 30 per cent. of uncrystallisable sugar, and the calcium and potassium citrates.

**Preparation.**—Pounded with twice their weight of refined sugar, they form Confectio Rosæ Caninæ, which in its turn is used as an excipient in Pilula Quinæ. The achenes are removed because the hairs with which they are surrounded are, like cowhage, exceedingly irritating.

## SUB-ORDER IV.—SANGUISORBEÆ.

Usually herbs with the corolla absent and the fruit or achænium enclosed in the calyx tube.

## SUB-ORDER V.—POMEÆ.

Trees or shrubs with either simple or compound leaves; stipules free; fruit a *pome*.

**CYDONIÆ SEMINA, Quince Seeds.**—The seeds of *Pyrus Cydonia*, a native of Western Asia, but cultivated in Southern Europe.

**Botanical Source.**—The *P. Cydonia* is a tree with ovate and entire leaves, and bearing a golden yellow *pome* resembling a pear, but differing by having 8 to 14 seeds in each cell embedded in a mucilaginous substance.

**Description.**—Mahogany-brown, ovoid, and three-sided seeds, generally agglutinated in masses.

**Uses.**—Demulcent, like linseed.

**Chemistry.**—The epidermis is so mucilaginous that it will absorb forty times its weight of water. The formula of this mucilage is $C_{12}H_{20}O_{10}$, and it is identical with that of linseed. The entire seed yields 20 per cent. of the dry mucilage.

Decoctum Cydoniæ (not official), 120 grains to 1 pint.

## SUB-DIVISION II.—EPIGYNÆ.

## NATURAL ORDER.—CUCURBITACEÆ.

Succulent herbs with alternate scabrous leaves and unisexual flowers, with regular monopetalous corollas; male flowers having 5 stamens, frequently united and with sinuous anthers; female flowers having inferior 3-celled ovary with parietal placentation; fruit a *pepo;* seeds numerous and exalbuminous.

The order is divided into 3 sub-orders:—

1. *Nhandirobeæ*, anthers not sinuous.
2. *Siceæ*, only one seed in fruit.
3. *Cucurbiteæ*, anthers sinuous and fruit a many-seeded pepo.

ELATERIUM.—The sediment from the juice of the nearly ripe fruit of *Ecballium officinarum* (*Ecballium Elaterium*), cultivated in England and also imported from Malta.

**Botanical Source.**—The plant is a coarse, decumbent annual, with hispid and scabrous stems, which are without tendrils; leaves cordate with a crenate margin, and also hispid; flowers monœcious, stamens in male flowers triadelphous; ovary in female flowers, 3-celled and inferior. The fruit a *pepo*, which dehisces with elasticity and forcibly projects the juice and seeds from an orifice formed by the separation from the stalk.

**Collection.**—The juice is lightly pressed from the longitudinally-sliced fruit, strained through a hair sieve, and set aside to deposit. The supernatant liquor having been poured off, the sediment is collected on a linen filter and dried on porous tiles.

**Description.**—In greenish grey, light and friable fragments, about 1-10th of an inch thick, curved and marked on the convex surface by the impressions of the calico filter. The best is the English, and the inferior is the Maltese, which is in larger pieces with scraps of paper attached, on which it has been dried.

**Uses.**—Drastic, purgative, and hydragogue. It is the most powerful purgative known, even more so than Croton Oil. It is used in dropsy, in mania, and to prevent apoplexy; but it requires great caution in its administration.

Its antidotes are, warm fomentations, demulcent drinks and opium, followed by stimulants if the circulation fail.

Dose, from 1-16th to ½ grain.

**Chemistry.**—The juice of the fruit yields 0·123 per cent. of Elaterium, 3 per cent. of organic and 1·5 per cent. of inorganic matter, and 95 per cent. of water. Elaterium contains starchy and extractive matter and a glucoside called *Elaterin* ($C_{20}H_{28}O_5$), though in the purest samples both starch and cellular tissue appear to be absent. Elaterin may be extracted by treating Elaterium with rectified spirit, which dissolves about half its weight, filtering, and pouring the concentrated solution into warm solution of potassium hydrate, when the Elaterin separates on cooling in colourless crystals. The B.P. says that Elaterium thus treated should yield not less than 20 per cent. of *Elaterin*.

Elaterium should not effervesce with acids, showing absence of chalk.

A more complete method of analysis is to exhaust with chloroform and then add ether, which instantly precipitates *elaterin*. The crystals may then be washed with ether and dried. By this process 36 and 27 per cent. of *elaterin* has been obtained from Mitcham and Maltese elaterium respectively.

**Pulvis Elaterii Compositus.**

| | |
|---|---|
| Elaterium | 10 grains |
| Sugar of Milk | 90 grains |

Rub them together in a mortar until they are reduced to a fine powder, and intimately mixed.

DOSE—½ to 5 grains.

COLOCYNTHIDIS PULPA, *Colocynth Pulp.*—The dried decorticated fruit of *Citrullus Colocynthis* freed from seeds. Imported chiefly from Smyrna, Trieste, France and Spain.

**Botanical Source.**—The *C. Colocynthis* is an annual herb, somewhat similar in appearance to a cucumber plant, but with the leaves more divided. The pepo is rounded and about the size of a large orange, and has a thin yellow rind.

**Description.**—The best is the Levant or *peeled* colocynth, in white balls, light and spongy, with the seeds enclosed, which have to be removed before sale. The second quality is the *unpeeled*, from Mogadore, which is the entire fruit covered with a thin brittle yellow rind.

100 parts of good fruits yield about 28 parts by weight of pulp, and 72 parts of seeds.

**Uses.**—In small doses an excellent purgative, especially in cases of long standing constipation; but in large doses it is a powerful drastic hydragogue and cathartic. It acts superficially upon the large intestines, and in extreme doses (100 grains) has proved fatal. It is useful in dropsy and uterine obstructions.

Dose, in powder, 2 to 8 grains.

**Chemistry.**—Colocynth pulp has been found to contain ¼ per cent. of Colocynthin, 13·2 per cent. of bitter resin, 14·4 per cent. of bitter principle, 10 per cent. of extractive, 30 per cent. of gummy matters, 5·7 per cent. of phosphates of lime and magnesia, and 19·2 per cent. of lignin.

*Colocynthin*, $C_{56}H_{84}O_{23}$, may be extracted by treating an alcoholic extract of colocynth with water, and mixing the solution first with neutral acetate of lead and afterwards with basic acetate of lead. From the filtered liquid the lead is separated by means of sulphuretted hydrogen, and then tannic acid is added which causes a precipitate. The precipitate is washed and dried, then decomposed by lead oxide and the colocynthin dissolved out by means of ether. Colocynthin is thus produced in yellow tufts which, when boiled with a dilute acid, yield *colocynthein*, $C_{44}H_{64}O_{13}$, and glucose.

The seeds contain about 17 per cent. of fixed oil, and are eaten roasted and boiled by some African tribes.

### Extractum Colocynthidis Compositum.

| | |
|---|---|
| Colocynth Pulp | 6 ounces |
| Extract of Socotrine Aloes | 12 ounces |
| Resin of Scammony | 4 ounces |
| Hard Soap, in powder | 3 ounces |
| Cardamom Seeds, fine in powder | 1 ounce |
| Proof Spirit | 1 gallon |

(100 lbs. of Pulp yield about 65 lbs. of simple extract.)

**Dose**—3 to 10 grains.

### Pilula Colocynthidis Composita.

| | |
|---|---|
| Colocynth Pulp, in powder | 1 ounce |
| Barbadoes Aloes, in powder | 2 ounces |
| Scammony, in powder | 2 ounces |
| Sulphate of Potash | ½ ounce |
| Oil of Cloves | 2 drachms (fluid) |
| Distilled Water | q.s. |

1 grain of Colocynth and 2 grains each of Aloes and Scammony in 6 grains.

**Dose**—5 to 10 grains. Syrup or glycerin is the best excipient.

### Pilula Colocynthidis et Hyoscyami.

| | |
|---|---|
| Compound Colocynth Pill | 2 ounces |
| Extract of Henbane | 1 ounce |

**Dose**—5 to 10 grains.

## NATURAL ORDER.—MYRTACEÆ.

### CAJUPUTI OLEUM, Oil of Cajuput.

—The oil distilled from the leaves ot ***Melaleuca minor***, imported from Batavia and Singapore.

**Description.**—A light bluish green mobile liquid with a powerful odour, having a sp. gr. of ·914 to ·925, and consisting chiefly of a hydrated *terpene*, $C_{10}H_{16}H_2O$, sometimes called hydrate of cajuputene, with some organic colouring matter. To prevent the oil losing its fine green tint it is kept in copper vessels, which accounts for the traces of copper found in many samples.

**Uses.**—Cajuput oil is occasionally administered as a stimulant, antispasmodic, and diaphoretic; externally it is frequently used as a rubefacient. Once a celebrated remedy for cholera.

**Preparations.**—Spiritus Cajuputi (1 in 50 rectified spirit). Dose, ½ to 1 drachm. Also contained in Linimentum Crotonis (3½ in 8).

**Eucalyptus Globulus.**—The leaves distilled in Australia with water yield a yellow fragrant oil, of which the main constituent is *Eucalyptol*, $C_{12}H_{20}O$. Various preparations of Eucalyptus have been introduced for their febrifuge qualities. *Eucalyptus resinifera* yields the red gum called Botany Bay Kino.

CARYOPHYLLI, Cloves.—The dried unexpanded flower buds of *Caryophyllus aromaticus*, cultivated in Penang, Bencoolen, and Amboyna.

**Botanical Source.**—The *C. aromaticus* is an evergreen shrub with dark purple flowers.

**Description.**—The reddish brown ball on the top is formed by the imbricated unexpanded corolla, and is situated on the darker brown tubular and four-toothed calyx. Oil should exude from good cloves when pressed with the nail.

**Uses.**—An aromatic and carminative addition to purgatives, to prevent griping. Dose, 1 to 3 drops. It is useful to microscopists instead of oil of turpentine, to render animal tissues transparent before mounting them in balsam or varnish.

**Chemistry.**—Cloves contain 18 per cent. of volatile oil and three other volatile bodies called *eugenin* ($C_{16}H_{12}O_2$), *salicylic acid* ($C_7H_6O_3$), and *caryophyllin* ($C_{10}H_{18}O$); 16 per cent. of a peculiar tannic acid, 13 per cent. of gum, 18 per cent. of water and extractive matter. The oil is a yellowish coloured liquid of the sp. gr. of 1·046 to 1·058. It is composed of a light oil isomeric with turpentine ($C_{10}H_{16}$), and a heavy oil called *eugenol* or *eugenic acid* ($C_{10}H_{12}O_2$). The latter combines with alkalies to form crystalline salts, which yield a blue with iron salts. They also give a red with nitric acid, and thus great care must be exercised not to mistake them for morphia.

**Infusum Caryophylli.**

| | |
|---|---|
| Cloves, bruised........................ | ¼ ounce |
| Boiling Distilled Water ................ | 10 fluid ounces |

Infuse in a covered vessel ½ hour, and strain.

*Incompatibles*—Salts of iron, zinc, lead, silver, and antimony; lime water and gelatin.

Dose—1 to 4 ounces.

Also an ingredient in Infusum Aurantii Compositum, 60 grains to 1 pint; Mistura Ferri Aromatica, ¼ ounce to 16 fluid ounces; Vinum Opii, 75 grains to 1 pint.

The oil is used in Confectio Scammoniæ, Pilula Colocynthidis Composita, and Pilula Colocynthidis et Hyoscyami, to prevent griping.

**Adulterations.**—1. *Mother Cloves* are the *fruits* of the clove-shrub, and are egg-shaped berries about an inch long and not nearly so fragrant as the buds. They contain starch, and therefore are easily detected by the microscope.

2. The stalks of cloves are used to mix with ground cloves, and may be detected by showing thick walled prosenchymatous cells under the microscope.

**PIMENTA, Pimento,** *Allspice or Jamaica Pepper.*—The dried unripe berries of *Eugenia Pimenta,* grown in the West Indies and imported almost entirely from Jamaica.

**Botanical Source.**—The *E. Pimenta* is an elegant evergreen tree, growing on calcareous soil.

**Description.**—Dark brown berries about the size of a pea crowned with the remains of the calyx, and of a deep brown colour, aromatic odour, and spicy taste.

**Uses.**—Like cloves, aromatic and stimulant. The chief use of pimento is as a culinary spice.

**Chemistry.**—The berries yield from 3 to 4 per cent. of volatile oil. They are also rich in tannin, striking with persalts of iron an inky black. The decoction is coloured deep blue with iodine, showing the presence of starch, and the berries also contain a little green fixed oil. The volatile oil is identical in all but odour with that of cloves. The fixed oil is acrid and forms a green solution with ether.

*Aqua Pimentæ*, 14 ounces to 2 gallons; distil 1 gallon. Dose, 1 to 2 ounces.

*Oleum Pimentæ.*—The oil distilled in Britain from pimento berries. It becomes reddish and afterwards brown by age. Its sp. gr. is 1·037. It is often termed essence of pimento.

## GRANATI RADICIS CORTEX,

**Pomegranate Root Bark.**—The dried bark of the root ot *Punica Granatum*, obtained from the South of Europe.

**Botanical Source.**—The pomegranate is a low tree, with small deciduous leaves and scarlet flowers. Its fruit is a *balausta* with a thick leathery rind, about the size of an apple, and crowned by very evident circular remains of the calyx.

**Description.**—In thin quills or fragments 3 or 4 inches long. The outer surface greyish and the inner greyish yellow, finely striated and often with little strips of tough white wood attached. The fracture is short and granular, and the taste astringent.

**Uses.**—Powerfully astringent; sometimes used in diarrhœa, as an injection for leucorrhœa, and as a gargle. By some it is thought to be slightly anti-periodic. The Chinese and Hindoos use the fresh bark for the expulsion of tœnia. The flowers are occasionally prescribed in an infusion under the name of *Flores balaustini.*

**Chemistry.**—It contains 22 per cent. of a peculiar tannic acid, a little gallic acid, and some mannite. The rind of the fruit was formerly official in the London Pharmacopeia, but is now almost obsolete in British medicine. It is an inferior syncarpous fruit, and is called a *balausta;* very similar in composition and properties to the cortical portion of the root.

Decoctum Granati Radicis, 2 ounces to 2 pints; boil down to 1 pint. Dose, 1 to 2 ounces.

**Adulterations.**—The bark of the stem and branches (which is less corky), and the bark of the barberry (*Berberis vulgaris*) and box (*Buxus sempervirens*), the decoctions of which are not affected by iron salts.

## NATURAL ORDER.—UMBELLIFERÆ

### [APIACEÆ].

Herbs or shrubs with usually compound leaves sheathing at the base; flowers, in umbels; calyx, monosepalous and superior; corolla, 5 petals incurved; stamens, 5 epigynous and incurved; ovary, inferior two-celled, with one pendulous ovule in each cell; fruit, a cremocarp, consisting of two mericarps adhering by their face (*commissure*) to a common axis (*carpophore*); seeds, albuminous.

The order is divided into three sub-orders:—

1. *Orthospermeæ*, albumen flat on its face. Ex. Œnanthe, Daucus.

2. *Campylospermeæ*, albumen rolled inwards at the edges. Ex. Conium.

3. *Cœlospermeæ*, albumen curved inwards at the base and apex. Ex. Coriandrum.

**CONII FRUCTUS, Hemlock Fruit.**—The dried fruits of *Conium maculatum*, from indigenous plants.

**Botanical Source.**—The true hemlock is a biennial herb, having the stem covered with dull purple spots, and not distinctly swollen at the nodes. The leaves are compound and tripinnate with dilated and sheathing petioles. The inflorescence is a compound umbel with both a general and a partial involucre.

**Description.**—As usually found in commerce the fruit consists not of the entire cremocarp, but of the mericarps only, which have become separated from the carpophore. They are about 1-8th of an inch long, and have their dorsal surface marked with 5 crenate ridges with channels between, which latter are striated longitudinally but are *destitute of vittæ.*

**Uses.**—Narcotic and sedative, acting especially on the spinal cord; used to allay cough in phthisis and spasmodic asthma; sometimes to ease the pain in cancerous affections. It is a cerebro-spinal poison, paralysing the muscles, and causing death by asphyxia. *Antidotes.*—Emetics, purges, and diffusible stimulants.

**Chemistry.**—They depend for their action on a volatile alkaloid called *conia*, $C_8H_{15}N$, supposed to be combined in the plant with malic acid. Conia is a colourless oily fluid with strongly alkaline reaction, boiling at 340° F., and having an odour resembling that of mice. It may be isolated by exhausting the seeds with acidulated water, evaporating to a syrup, and adding excess of potassium hydrate. This liquid is then shaken up with ether, which when decanted and spontaneously evaporated leaves the alkaloid. Roughly, the presence of conia may be proved in any part of the hemlock plant, or in any of its preparations by rubbing and heating with a little solution of potassium hydrate, when the "mousey" smell will be distinctly perceptible.

**Tinctura Conii.**

| | |
|---|---|
| Hemlock Fruit, bruised ................ | 2½ ounces |
| Proof Spirit .........................ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

DOSE—20 to 60 minims (1 grain of Hemlock fruit in 9 minims.)

According to recent medical statement, Hemlock, in all its preparations, may be given in much larger doses than those indicated in the British Pharmacopœia.

**CONII FOLIA, Hemlock Leaves.**—The fresh leaves and young branches; also the leaves separated from the branches and carefully dried, gathered from wild British plants when the fruit is beginning to form.

## Cataplasma Conii.

| | |
|---|---|
| Hemlock Leaf, in powder | 1 ounce |
| Linseed Meal | 3 ounces |
| Boiling Water | 10 fluid ounces |

## Extractum Conii.

The expressed juice of the fresh leaves and young branches of Hemlock, evaporated to an extract. (100 lbs. yield about 5½ lbs. of extract.)

Dose—2 to 6 grains.

## Pilula Conii Composita.

| | |
|---|---|
| Extract of Hemlock | 2½ ounces |
| Ipecacuanha, in powder | ½ ounce |
| Treacle | q.s. |

Dose—5 to 10 grains (2½ grains of Hemlock in 3 grains.)

## Succus Conii.

| | |
|---|---|
| Hemlock Juice | 3 pints |
| Rectified Spirit | 1 pint |

Filter after standing 7 days.

Dose.—½ drachm to 1 drachm. (12 minims equal to 1 grain of extract.)

## Vapor Coniæ.

| | |
|---|---|
| Extract of Hemlock | 60 grains |
| Solution of Potash | 1 fluid drachm |
| Distilled Water | 10 fluid drachms |

Dose—20 minims placed on a sponge, in a suitable apparatus, that the vapour of hot water passing over it may be inhaled.

**Adulterations.**—1. The leaves of *Chærophyllum Anthriscus*, known by their more or less downy nature.

2. Those of *Æthusa Cynapium* or *Fools' Parsley*, altogether smaller as a whole, and not nearly so acute in the segments of the leaflets.

## CARUI FRUCTUS, Caraway Fruits,

*vulgo Seeds.*—The dried fruit of *Carum Carui*, cultivated in England and Germany.

**Botanical Source.**—A biennial herb with bipinnate leaves having linear segments and large vaginas. If any general involucre at all, it only consists of one leaf, while there are no partial involucres.

**Description.**—The mericarps, which either hang loosely to the carpophore or are altogether separated, are about 1-6th of an inch long and 1-20th in diameter. They are slightly arched, with 5 pale filiform ridges and dark brown channels between, with one vitta in each channel. A pair of vittæ are also visible on the commissure.

**Uses.**—Aromatic, stomachic, and carminative. Very useful in flatulence, and to prevent the griping of purgatives.

**Chemistry.**—The active principle is the volatile oil, of which good fruits yield from 4 to 6 per cent. It consists of 2-3rds of *carvol* ($C_{10}H_{14}O$) and 1-3rd of *carvene* ($C_{10}H_{16}$). The former is isomeric with menthol, myristicol, and thymol; and the latter with turpentine.

**Aqua Carui.**

| | |
|---|---|
| Caraway Fruit, bruised | 16 ounces |
| Water | 2 gallons |

Distil 1 gallon. (1 of Fruit in 10.)

Also contained in Confectio Opii (1 in 10); Confectio Piperis (3 in 20); Pulvis Opii Compositus (1 in 2½); Tinctura Cardamomi Composita; and Tinctura Sennæ.

**CARUI OLEUM, Oil of Caraway.**—The oil distilled in Britain from caraway fruit. It is colourless or pale yellow, sp. gr. ·950, and is an ingredient in Confectio Scammonii and Pilula Aloes Barbadensis.

**FŒNICULI FRUCTUS, Fennel Fruits.**—The ripe fruits of *Fœniculum dulce*, imported from Malta.

**Botanical Source.**—The fennel is a herb with perennial root, and decompound leaves with fine fringe-like segments; the whole plant growing 3 to 5 feet high, and having a large compound umbel with 6 or 8 long thin rays.

**Description.**—When undivided the cremocarp is about 1-4th of an inch long and 1-10th in diameter. They are pale coloured, and have 8 brownish ridges with vittæ in the channels, surrounded by a dark brown tissue. The two lateral ridges are double, so that when split each mericarp appears to have 5 ridges.

**Uses.**—Carminative; used to relieve flatulence.

**Chemistry.**—Fennel contains 3½ per cent. of volatile oil, 12 per cent. of fixed oil, and sugar. The volatile oil is analagous to that of anise, and consists of *anethol* or *anise camphor*, $C_{10}H_{12}O$, and a variable portion of a liquid isomeric with turpentine. There are three varieties of oil of fennel in commerce:—Oil of sweet fennel, which has a sweet taste; oil of bitter fennel, prepared in France, and having a bitter taste; and Saxon oil of fennel, which resembles the oil obtained from the sweet fennel.

Aqua Fœniculi, 1 lb. to 2 gallons; distil 1 gallon.

**ANISI FRUCTUS,** Aniseed.—The fruit of ***Pimpinella Anisum***, indigenous to Asia Minor, but cultivated in France, Spain, Malta, and Greece.

**Botanical Source.**—The anise is a low annual, with cordate and divided radical leaves and biternate cauline leaves. The umbels are many rayed and have no involucres.

**Description.**—Generally entire cremocarps, about 2-10ths of an inch long, on slender pedicels, and crowned by a pair of short styles. The fruit has 10 pale-coloured ridges, so that it has a prismatic appearance. All the surface is covered with minute hairs.

**Uses.**—Similar to carraways.

**Chemistry.**—Aniseed yields about 2 per cent. of a volatile oil, concreting when cooled to 50° F. It consists of an elœopten isomeric with turpentine, $C_{10}H_{16}$, and a stearopten called *anethol*, or *anise camphor*, $C_{10}H_{12}O$, which fuses at 64·4° F., and when treated with diluted nitric acid forms oil of meadow-sweet, *anisyl hydride* ($C_8H_7OH$), together with oxalic and anisic acids.

Oleum Anisi, distilled in Europe from anise fruit.

Essentia Anisi (1 of oil in 4 of rectified spirit). Also contained in Tinctura Opii Ammoniata and Tinctura Camphoræ Composita.

The anise fruits are apt to get mixed with conium by mistake, and therefore the two should be carefully compared.

**Adulteration.**—Spermaceti, detected by shaking up with cold spirit, in which the oil is soluble, and spermaceti insoluble. Camphor may be detected by its odour.

**ANETHI FRUCTUS, Dill Fruit.**—The dried fruit of *Anethum graveolens*, cultivated in England and imported from Middle or Southern Europe.

**Botanical Source.**—The dill is an annual herb, with a smooth but finely striated stem, and not over 2 feet high. The leaves are tripinnate, with fringe-like segments, and very broad vaginas. The umbels have neither general nor partial involucres.

**Description.**—Oval and very flat in form, and usually split into mericarps, which have 5 filiform ridges—3 sharply keeled, and 2 losing themselves in the spreading margin. The vittæ are broad and solitary and fill the whole channels.

**Uses.**—Aromatic and carminative; given to infants to relieve flatulence, and the water is used as a vehicle for other medicines.

**Chemistry.**—The fruit yields about 3 per cent. of volatile oil, a large proportion of which was found by Gladstone to be a hydro-carbon, $C_{10}H_{16}$, which he called Anethene. He also found oil of dill to contain an oxygenated oil, $C_{10}H_{14}O$, which he regarded as identical with carvol.

Aqua Anethi, 1 pound to 2 gallons; distil 1 gallon.

### CORIANDRI FRUCTUS, Coriander Fruit.

—The dried ripe fruit of *Coriandrum sativum*, cultivated in Britain.

**Botanical Source.**—An annual herb, about 2 feet high, with bipinnate leaves, the under ones with broad and the upper with very fine segments. Umbels, with both involucres.

**Description.**—Always found entire as a pale yellow globular cremocarp, about the size of a white peppercorn, with the remains of style and calyx very distinct on the top. 10 *zigzag* primary ridges and 8 more prominent secondary ones, and no vittæ in the channels.

**Uses.**—Aromatic carminative. It is used to disguise nauseous medicines, and in order to prevent griping.

**Chemistry.**—The active principle is a volatile oil, $C_{10}H_{18}O$, of which the fruit yields 0·5 per cent. Its sp. gr. is 0·87, and it is soluble in ether and glacial acetic acid. The fruit also contains 13 per cent. of fixed oil. It is isomeric with *borneol*, $C_{10}H_{18}O$.

Coriander fruit is a constituent of Confectio Sennæ, Mistura Gentianæ, Syrupus Rhei, Tinctura Rhei, Tinctura Sennæ.

*Oleum Coriandri* (Oil of Coriander).—The oil distilled in Britain and described above, enters into the composition of Syrupus Sennæ B.P.

## CUMINI FRUCTUS, Cumin Fruit.

—The dried fruit of *Cuminum Cyminum*, imported from Sicily, Malta, and Mogadore.

**Botanical Source.**—An annual umbellifer, with both involucres, growing about 2 feet high.

**Description.**—Usually unseparated cremocarps, of a brown colour, about ¼ of an inch long, 5 filiform primary ridges, and 4 secondary ones on each mericarp, the latter being hairy; 1 vitta between the primary ridges and 2 on the commisure.

**Uses.**—A constituent in curry powder, and used in horse medicine.

**Chemistry.**—Yields a pale yellow volatile oil containing about equal parts of *cymol*, $C_{10}H_{14}$, and *cuminic aldehyd*, $C_{10}H_{12}O$. The former is the hydro-carbon of which turpentine is the hydride.

**SUMBUL RADIX, Sumbul Root.**—The dried transverse sections of the root of *Euryangium Sumbul*, imported from Russia and also from India.

**Botanical Source.**—A perennial plant, about 10 feet high, with a very fragrant milky juice; discovered in 1869 near Samarkand.

**Description.**—Nearly round pieces, 1 to 1½ inch thick and 3 to 5 inches long, dusky brown and covered with bristly fibres. Internally it is porous, and has an odour of musk.

**Uses.**—Nervous stimulant and antispasmodic, and prescribed in the form of tincture as a substitute for musk in hysteria and epilepsy.

**Chemistry.**—The root yields 9 per cent. of balsamic resin, about 0·75 per cent. of sumbulic, sumbulolic, or angelic acid, a small quantity of volatile oil, and a trace of valerianic acid. The resin is converted by solution of potassium hydrate into a crystalline potassium salt of sumbulamic acid, which has a strong musk-like odour, and appears to differ from the sumbulic acid before noticed.

**Tinctura Sumbul.**

| | |
|---|---|
| Sumbul Root, in coarse powder ........ | 2½ ounces |
| Proof Spirit ........................ | 1 pint |

Dose—10 to 30 minims.

ASSAFŒTIDA (more correctly *Asafœtida*).—A gum-resin, obtained in Affghanistan and the Punjaub by incision from the living root of *Narthex Asa-fœtida.*

**Botanical Source.**—The *N. Asa-fœtida* is a magnificent herb, rising to 10 feet in height, and with radical leaves bipinnate in form and 1½ feet long. It has flowered twice only since 1838 in the Edinburgh Botanical Gardens.

**Collection.**—A thin slice is cut from the crown of the root, and the juice which exudes is scraped off after a few days, the root being kept covered in the meantime by twigs and stones. The finest gum-resin comes solely from the leaf bud at the centre of the root crown.

**Description.**—In irregular, softish masses of tears, white when first cut into, but becoming purplish pink by exposure, and having a very nauseous alliaceous odour. When rubbed with water it forms a milky emulsion, and when treated with sulphuric acid it yields a solution, which when diluted and neutralised, has a bluish fluorescence. A very fine quality in pure tears exists, but is rarely met with.

**Uses.**—Anti-spasmodic, expectorant, stimulant. It is of great use in hysteria, nervous debility, flatulency, spasmodic cough, and other affections of the chest, where there is no inflammation. But for the ill flavour of the drug, the Spiritus Ammoniæ Fœtidus is a most valuable medicine. Dose, 5 to 20 grains, best given in the form of emulsion. The gum dissolves in the water suspending the oil and resin.

**Chemistry.**—Contains 3 to 5 per cent. of volatile oil, 40 per cent. of gum, and the remainder resin. The oil is at first neutral, but by keeping it becomes acid and evolves sulphuretted hydrogen. Owing to its horrible odour it has not been properly investigated, but is supposed to be a sulphur compound of *allyl*. The resin is not entirely soluble either in ether or chloroform, but is soluble in warm nitric acid. It contains *ferulaic acid*, $C_{10}H_{10}O_4$. From the presence of sulphur in the oil, pills containing asafœtida should never be silvered, as they become black. The best coating is etherial tincture of tolu.

**Enema Asafœtidæ.**

| | |
|---|---|
| Asafœtida | 30 grains |
| Distilled Water | 4 fluid ounces |

Rub the Asafœtida with the water, added gradually, for one enema.

**Pilula Asafœtidæ Composita.** (Pil. Galban. Co. P.L.)

| | |
|---|---|
| Asafœtida | 2 ounces |
| Galbanum | 2 ounces |
| Myrrh | 2 ounces |
| Treacle, by weight | 1 ounce |

(3 grains each Aloes, Galbanum, and Myrrh, in 10½ grains.)

Dose—5 to 10 grains.

**Spiritus Ammoniæ Fœtidus.**

| | |
|---|---|
| Asafœtida | 1½ ounce |
| Strong Solution of Ammonia | 2 fluid ounces |
| Rectified Spirit ad. | 20 fluid ounces |

Macerate 24 hours, distil, and add the Ammonia to the product.

Dose—½ to 1 drachm (4 grains of Asafœtida in 1 fluid drachm.)

**Tinctura Asafœtidæ.**

| | |
|---|---|
| Asafœtida, in small fragments .......... | 2½ ounces |
| Rectified Spirit ....................ad. | 20 fluid ounces |

Macerate 7 days, then filter.

Dose—½ to 2 drachms (7 grains of Asafœtida in 1 fluid drachm.)

Also contained in Pilula Aloes et Asafœtidæ (1 in 4).

**GALBANUM.**—A gum-resin obtained from an unascertained umbelliferous plant. Imported from India and the Levant.

**Botanical Source.**—Although not perfectly certain, the source of galbanum is generally believed to be the *Ferula Galbaniflua*, a plant growing on the slopes of the mountains of Northern Persia.

**Collection.**—So far as is known, the gum-resin appears to exude spontaneously from the bases of the leaves.

**Description.**—In irregular tears about the size of a hazel nut, having a tendency to agglutinate and form a greenish yellow to a brown colour. In one variety the tears are translucent, and in another dull, waxy, and light yellow—the latter quality being that rarely found in agglutinated masses. Galbanum has a heavy peculiar odour, and an acrid and alliaceous taste.

**Uses.**—Resembles asafœtida in action, but is less energetic. It is employed principally in the form of plaister, as an external stimulant to chronic tumours. Dose, in the form of an emulsion, 10 to 30 grains.

**Chemistry.**—Galbanum contains about 7 per cent. of volatile oil, 32 per cent. of gum, and 60 per cent. of resin. The oil, obtained by distillation with water, is isomeric with turpentine, boils at 325° F., and smells of the drug. The resin is soft and easily soluble in ether and alkalies, but only partially in carbon disulphide. When heated to 212° F. with hydrochloric acid, and the acid solution shaken with chloroform, the latter leaves on evaporation colourless needle-shaped crystals of *umbelliferone*, $C_9H_6O_3$. This body is yielded not only by galbanum, but also by many umbelliferous resins, It is soluble in water, and on adding an alkali the solution shows a bright blue fluorescence, immediately destroyed by an acid.

**Emplastrum Galbani.**

| | |
|---|---|
| Galbanum | 1 ounce |
| Ammoniacum | 1 ounce |
| Yellow Wax | 1 ounce |
| Lead Plaister | 8 ounces |

Also contained in Pilula Asafœtida Composita (1 in 3½ nearly).

**AMMONIACUM.**—A gum resin, obtained by exudation from *Dorema Ammoniacum*, and collected in Persia and the Punjaub.

**Botanical Source.**—The *D. Ammoniacum* is a herb with a perennial root, and having a flower-stem which grows 6 to 8 feet high perfectly leafless, and bears numerous umbels of white downy flowers.

**Collection.**—The stem becomes about June so gorged with juice that it exudes at the slightest puncture, and just then the plant is attacked by a beetle which pierces it, and the juice running out hardens in tears, which are collected.

**Description.**—There are two qualities:—1. *Tear Ammoniacum*, which is the best, and is found in roundish tears from the size of a pea to that of a hazel nut. They have a creamy yellow to reddish brown colour externally, and are brittle, opaque and milky white inside the fracture, having a waxy lustre. 2. *Lump Ammoniacum* (the inferior quality) is in brittle masses of agglutinated tears, usually mixed with fragments of the mericarp of the fruit of the plant and other impurities.

Both varieties have a faint odour and nauseous taste, and when rubbed with water they form white emulsions. They are also coloured yellow by solution of potassium hydrate, and bright orange by chlorinated lime.

**Uses.**—Expectorant, and generally stimulating to the mucous membranes. Externally it is a resolvent to scirrhus tumours, the B.P. plaister being an excellent application for "housemaid's knee."

Dose, 10 to 20 grains in emulsion with yolk of egg.

**Chemistry.**—Contains 2 per cent. of volatile oil, 28 per cent. of gum, and 70 per cent. of resin. It however yields no umbelliferone. The researches on its oil and resin are not satisfactory as yet.

**Test to distinguish between Ammoniacum, Asafœtida, and Galbanum.**—Warm the gum-resin (or, better, the resin extracted by alcohol or ether) with *strong* hydrochloric acid, and then slowly add spirit of wine. Ammoniacum is not affected; Asafœtida turns dirty green; and Galbanum becomes bluish violet.

**Emplastrum Ammoniaci • Hydrargyro.**

| | |
|---|---|
| Ammoniacum | 12 ounces |
| Mercury | 3 ounces |
| Olive Oil | 1 fluid drachm |
| Sublimed Sulphur | 8 grains. |

**Mistura Ammoniaci.**

| | |
|---|---|
| Ammoniacum, in coarse powder | ¼ ounce |
| Distilled Water | 8 fluid ounces |

DOSE—½ to 1 ounce (14 grains of Gum in 1 fluid ounce.)

Also contained in Emplastrum Galbani (1 in 11); Pilula Ipecacuanhæ cum Scillâ (1 in 7); Pilula Scillæ Composita (1 in 6¼).

**Table for the Detection of the Umbelliferous Gum-Resins.***—All are imperfectly attacked both by chloroform and ether; the alcoholic solutions are rendered turbid by ammonium hydrate, and give no precipitate with alcoholic ferric chloride (1 in 10).

I. *The drugs contain sulphur* (by fusion with nitre and testing with $BaCl_2$).

A. Yields umbelliferone by dry distillation.

1. Hydrochloric acid colours the petroleum spirit extract residue reddish yellow; the chloral test colours it green.—*Persian Sagapenum.*

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* E. HIRSCHSOHN, "Pharmaceutical Journal," Nov. 17, 1877.

2. Hydrochloric acid colours the residue blue-violet; the chloral test colours it rose-colour to raspberry-red and violet.—*Levant Sagapenum.*

3. Not coloured by hydrochloric acid. The solution of the drug in sulphuric acid is yellow-brown with a blue fluorescence. Potassium nitrate colours the gum-resin malachite green.—*Ordinary Asafœtida.*

B. Yields no umbelliferone by dry distillation.

1. Sodium carbonate solution colours the drug light brown, and the extract is not altered by acetic acid or lead acetate.—*Asafœtida from Ferula alliacea.*

II. *The drugs contain no sulphur.*

A. Yields umbelliferone by dry distillation.

1. The petroleum spirit extract residue is coloured by hydrochloric acid and the chloral test.

*a.* Hydrochloric acid colours reddish yellow; the chloral test colours green.—*Persian Galbanum.*

*b.* Hydrochloric acid colours red-violet; the chloral test colours greenish.—*Levant Galbanum, as at present in commerce.*

*c.* Hydrochloric acid colours violet-blue; the chloral test carmine-red.—*Older specimens of Levant Galbanum.*

2. Hydrochloric acid gives no colour; the chloral test colours light brown.—*African Ammoniacum.*

B. Yields no umbelliferone by dry distillation.

1. Chloride of lime solution colours the gum-resin orange-yellow.—*Persian Ammoniacum.*

2. Chloride of lime solution produces no colour; lead acetate gives no precipitate.

*a.* Iodine solution is not altered; the chloral test colours greenish.—*Olibanum.*

3. Chloride of lime solution produces no colour; lead acetate gives a precipitate; bromine solution produces no colour, or only yellowish; ferric chloride, green.—*Opoponax.*

## SUB-CLASS III.—COROLLIFLORÆ.

Plants having both calyx and corolla united and the stamens epipetalous; rarely epigynous or hypogynous. This sub-class has 3 sub-divisions:—

1. Epigynæ, having the ovary inferior.

2. Hypostamineæ, having the ovary superior and the stamens hypogynous.

3. Epipetalæ, having the ovary superior and the stamens epipetalous.

## SUB-DIVISION I.—EPIGYNÆ.

## NATURAL ORDER.—CAPRIFOLIACEÆ.

**SAMBUCI FLORES, Elder Flowers,** *Fleurs de Sureau.*—The fresh flowers of the *Sambucus nigra*, indigenous to Central and Southern Europe, and also a native of England and Ireland, but not of Scotland.

**Botanical Source.**—An arborescent plant with opposite compound and imparipinnate leaves having ovate, serrate, and cuspidate leaflets. Inflorescence a broad flat cyme of small flowers which have a monopetalous rotate, cream coloured corolla; stamens, 5; stigma 3-lobed and sessile.

**Collection.**—The bunches of flowers are laid in heaps for some hours, when a little heat being developed the corollas become detached, and are then rubbed or shaken off from the stalks and dried rapidly.

**Uses.**—Simply employed as a flavouring agent, and as a cooling external application.

**Chemistry.**—The flowers yield by distillation slight traces of some volatile acids, and a small amount of an essential oil. This latter is of a buttery consistence, has the characteristic smell of elder, and is easily decomposed by exposure to the air.

*Aqua Sambuci* (1 in 1).

The flowers may also be digested with lard to form an ointment (1 in 1), and the fruit, which is a globular black berry, is used for making elder wine.

## NATURAL ORDER.—CINCHONACEÆ.

[*This is regarded by many botanists as a Sub-order of the Natural Order* RUBIACEÆ.]

**CATECHU PALLIDUM, Pale Catechu**; *Gambier, Gambir or Terra Japonica.*—An extract from the leaves and young shoots of *Uncaria Gambier*, chiefly imported from Singapore.

**Botanical Source.**—The *Uncaria Gambier* is a strong climbing shrub and is a native specially of the Islands at the eastern end of the Straits of Malacca;

of the Eastern Archipelago generally, and of Ceylon. Another plant known as *U. acida* is also sometimes employed.

**Collection.**—The leaves and shoots are boiled with water in an iron pan and then squeezed. The decoction is evaporated to a syrupy consistence, and then poured into buckets and kept mixed while cooling by pushing a stick up and down. When cooled to the consistence of clay, the extract is cut into cubes and dried.

**Description.**—In cubes, either free or coherent, each about an inch square, which are externally brownish and internally pale, dull, reddish yellow. They are odourless, friable, and have a dull fracture and an astringent taste, at first slightly bitter, but subsequently decidedly sweetish. Examined microscopically the cubes are found to be built up of small needle-shaped crystals.

**Uses.**—An astringent in diarrhœa and Pyrosis, but chiefly consumed by the dyeing and tanning trades, owing to the tannic acid.

**Chemistry.**—Very similar to Cutch. (See Acacia Catechu, page 146.) Active principle, tannic acid.

### Infusum Catechu.

| | |
|---|---|
| Pale Catechu, in coarse powder | 160 grains |
| Cinnamon, bruised | 30 grains |
| Boiling Distilled Water | 10 fluid ounces |

Infuse in a covered vessel ½ hour, and strain.

*Incompatibles.*—The alkalies and alkaline earths; most metallic salts; gelatin; most vegetable infusions containing an alkaloid, as Decoctum Cinchonæ.

Dose—1 to 2 ounces.

### Pulvis Catechu Compositus.

| | | |
|---|---|---|
| Pale Catechu, in fine powder | | 4 ounces |
| Kino | do. | 2 ounces |
| Rhatany Root | do. | 2 ounces |
| Cinnamon Bark | do. | 1 ounce |
| Nutmeg | do. | 1 ounce |

Dose—20 to 40 grains (8 grains of Catechu and 4 grains each of Kino and Rhatany in 20 grains).

### Tinctura Catechu.

| | |
|---|---|
| Pale Catechu, in coarse powder | 2½ ounces |
| Cinnamon Bark, bruised | 1 ounce |
| Proof Spirit ad. | 20 fluid ounces |

Macerate 7 days, strain, press, and filter.

Dose—½ to 2 drachms (7 grains Catechu in 1 fluid drachm.)

### Trochisci Catechu.

| | |
|---|---|
| Pale Catechu, in powder | 720 grains |
| Refined Sugar, in powder | 25 ounces |
| Gum Acacia, in powder | 1 ounce |
| Mucilage of Gum Acacia | 2 fluid ounces |
| Distilled Water | q.s. |

Divide into 720 lozenges.

Dose—1 or more. (Each lozenge contains 1 grain of Catechu.)

## CINCHONÆ FLAVÆ CORTEX,

**Yellow Cinchona Bark.**—The bark of *Cinchona Calisaya*, collected in Bolivia and Southern Peru.

**Botanical Source.**—The *C. Calisaya* is a tall tree generally overtopping all others in the forests of Bolivia. It is evergreen, and bears fine panicled cymes of pink flowers.

**Collection.**—By preference the tree is cut down just above the ground, but so as to leave a "stool" from which young shoots may once more spring. The bark is loosened and denuded of its *periderm* (i.e., *epiphlœum* and a portion of the *mesophlœum*, which has become dry and useless with age) by beating with a mallet, and is then cut off in slips from 15 to 18 inches long and about 4 wide. If these are from the younger branches they are at once placed in the sun to dry and curl up into "quill bark"; but if from the older stem they are dried under slight pressure into "flat bark." When dry, the pieces are packed in *serons* or bales of hides.

**Description.**—There are two varieties of this bark: —1. *Flat yellow bark*, in pieces deprived of the *periderm* about 3 lines thick and 1 to 3 inches wide, but varying much in length. The bark is compact, heavy, and marked externally by longitudinal depressions, which are broad, shallow, and irregular, of which the internal or liber surface is tawny yellow, and most distinctly fibrous in structure. When broken the true bark has a very short and finely fibrous fracture. The odour is slightly aromatic, and the taste bitter.

2. *Quill yellow bark*, in double quills (*i.e.*, rolled in at both edges) from ¾ to 1½ inch in diameter. The *periderm* is greyish or silvery white externally, and is thick, rugged, and marked with deep cracks with slightly elevated edges, and running both along and across. The inner surface is dark brown and fibrous, and the fracture is very shortly fibrous.

**Uses.**—Anti-periodic, tonic and astringent. Administered in all kinds of intermittent fevers and intermittent neuralgic affections. The doses of the bark, or quinine, should always be taken *in the interval between the paroxysms*, and never while the fit is on. Either a full dose may be administered just before the expected return of the paroxysm, or a series of small and separate doses may be kept up during the whole time of intermission. *As a tonic* it is useful in all cases of convalescence from acute diseases, in dyspepsia and scrofula; and as an *astringent* it is employed in gargles.

The dose of sulphate of quinine is from 1 to 10 grains, and of yellow bark in powder, as a tonic, 15 to 30 grains, and as an anti-periodic, 1 to 2 drachms.

**Tests.**—1. *Qualitative.*—All true cinchona barks, really containing one or other of the cinchona alkaloids, will give off deep crimson fumes when heated in a test tube.

2. *Quantitative.*—The official process is as follows:—Boil 100 grains of the bark, reduced to very fine powder, for a quarter of an hour in one fluid ounce of distilled water acidulated with 10 minims of hydrochloric acid, and allow it to macerate for 24 hours. Transfer the whole to a small displacement tube, and after the fluid has ceased to percolate, add at intervals about 1½ ounces of similarly acidulated water, or until the fluid, which passes through, is free from colour. Add to the percolated fluid, solution of subacetate of lead, until the whole of the colouring matter has been removed, taking care that the fluid remains acid in re-action. Filter and wash it with a little distilled water. To the filtrate add about 35 grains of caustic potash, or as much as will

cause the precipitate which is first formed to be nearly re-dissolved; and afterwards six fluid drachms of pure ether. Then shake briskly; and having removed the ether, repeat the process twice, with three fluid drachms of ether, or until a drop of the ether employed, leaves on evaporation, scarcely any perceptible residue. Lastly, evaporate the mixed etherial solutions in a capsule. The residue, which consists of nearly pure quinia, when dried should weigh not less than two grains, and should be readily soluble in diluted sulphuric acid.

NOTE.—This process being for the estimation of Quinine only, is not applicable to the pale or red barks in which the value depends, not on the Quinine only, but on the entire mixed alkaloid which the bark contains. When examining the pale or red barks, therefore, the B.P. orders the substitution of chloroform for ether in the above process. The residue weighed is considered to be "mixed alkaloids."

**Chemistry.**—Yellow cinchona bark contains a series of chief alkaloids—viz., quinia, cinchonia, quinidia, cinchonidia, and the amorphous alkaloids all in combination with kinic, quinovic, cincho-tannic, and cincho-fulvic acids, together with a trace of volatile oil and the usual woody fibre.

*The following are short descriptions of the more important constituents:—*

QUINIA, $C_{20}H_{24}N_2O_2.8H_2O$, may be prepared by dissolving sulphate of quinine in water by the aid of a little sulphuric acid, and then precipitating with the slightest possible excess of ammonia. The precipitate, dissolved in strong alcohol, crystallises in silky prisms, having three molecules of water of crystallisation. It is slightly soluble in water (1 in 350), and very soluble in ether, alcohol, and chloroform. Its aqueous solution is slightly alkaline to test paper. It dissolves readily in acids to form salts, and is re-precipitated by ammonia soluble in excess.

TESTS.—1. Chlorine water, added to a solution of quinine and followed by the addition of a drop or two of ammonia, produces a bright green colour.

2. If a drop or two of potassium ferro-cyanide in solution be added *between* the chlorine water and ammonia, an evanescent red is produced.

3. By dissolving the salt of quinine in proof spirit containing 5 per cent. of sulphuric acid, and then adding tincture of iodine, a precipitate is formed which consists of herapathite. It is in brilliant crystals of greenish tint

and metallic lustre. Its formula has been defined as $2C_{20}H_{24}N_2O_2.I_6 3(H_2SO_4.)3H_2O$; different formulæ are however given.

**Quinidia**, $C_{20}H_{24}N_2O_2.2H_2O$, is isomeric with quinia. It agrees with that alkaloid in bitterness, fluorescence, and in the chlorine water and ammonia re-action. It may, however, be separated by precipitation by potassium iodide, with which it forms an insoluble iodide of quinidia. It crystallises from ether in long rhombic prisms.

**Cinchonia**, $C_{20}H_{24}N_2O$, crystallises in four-sided prisms, fusible at 320 F. It is much more soluble in water than quinia (1 in 250); it is soluble in alcohol, but only very slightly soluble in ether, this latter point forming a simple method of separating it from quinia, which is freely soluble. Its salts do not show fluorescence in solution, and when treated with chlorine water, and ammonia, they yield a white precipitate instead of a green colour. The precipitated solutions of its salts by ammonia are practically insoluble in excess.

**Cinchonidia** crystallises from alcohol in anhydrous, rhombic prisms. It is isomeric with cinchonia, from which it may be separated by precipitation of the mixed sulphates by Rochelle salt, when it is precipitated as tartrate, leaving the cinchonia in solution.

Quinicine and Cinchonicine are amorphous alkaloids, produced in the making of the quinine. They are not crystallisable, and are doubtless formed by the action of the mineral acids; possessing about the same relation to quinine and cinchonine, as treacle and sugar bear to each other. They are sometimes classed together under the name of quinoidine.

Kinic (Quinic) acid, $C_7H_{12}C_6$, crystallises in bold plates, soluble in two parts of water; less soluble in alchohol, and almost insoluble in ether. It may be precipitated by heat, and yields when treated with manganese peroxide and sulphuric acid, *Quinone*, $C_6H_4O_2$, together with carbonic anhydride and water. The quinone collects in deep yellow prisms on the cool part of the apparatus. By destructive distillation, *per se*, kinic acid yields benzol, benzoic, and salicylic acids, with hydro-quinone, $C_6H_6O_2$, and carbonic anhydride.

Quinovic acid, $C_{24}H_{38}O_4$, only exists in small quantity. It is soluble in boiling alcohol.

Cincho-tannic acid, $C_{14}H_{12}O_7H_2O$, exists to a considerable extent. It may be precipitated from a decoction of cinchona bark (which has been previously freed by magnesia from the presence of cinchona-red) by the addition of plumbic acetate; and the precipitate so produced, having been suspended, is treated with sulphuretted hydrogen, which removes the lead, leaving the cinchotannic acid in solution. It is very soluble in water, alcohol, and ether. Its solutions are turned green by ferric-chloride; and, in contact with excess of alkalies, it undergoes decomposition, yielding cinchona-red. It also yields precipitates with tartar emetic and gelatin.

Cinchona-red, $C_{12}H_{14}O_7$, is called "cincho-fulvic acid," and is the natural colouring matter of the bark, from which it may be extracted by the action of alkalies with which it forms a deep red solution. It is precipitated from its ammoniacal solution by hydrochloric acid.

**Decoctum Cinchonæ Flavæ.**

| | |
|---|---|
| Yellow Cinchona Bark, in coarse powder. | 1¼ ounce |
| Distilled Water ...................... | 1 pint |

Boil 10 minutes in a covered vessel, and strain when cold; make up product to 20 fluid ounces.

*Incompatibles*—The alkalies and their carbonates, lime water, most metallic salts, and gelatin.

DOSE—1 to 2 ounces.

In the decoction of yellow bark many of the alkaloids which have been extracted by the boiling water are precipitated on cooling by the cincho-tannic acid, and are consequently filtered out.

**Extractum Cinchonæ Flavæ Liquidum:**

| | |
|---|---|
| Yellow Cinchona Bark, in coarse powder. | 16 ounces |
| Rectified Spirit .......................... | 1 fluid ounce |
| Distilled Water .......................... | q.s. |

Product, 4 ounces; sp. gr. 1·100. (1 drachm is equivalent to ½ ounce of Bark, or 10 fluid ounces of Infusum Cinchonæ Flavæ.)

Dose—10 to 30 minims.

As usually met with, this preparation contains scarcely any alkaloids at all, and must simply be viewed as an astringent, and even then one of weak strength.

**Infusum Cinchonæ Flavæ.**

| | |
|---|---|
| Yellow Cinchona Bark, in coarse powder. | ½ ounce |
| Boiling Distilled Water ................. | 10 fluid ounces |

Infuse in a covered vessel for 2 hours, and strain.

*Incompatibles*—The alkalies and their carbonates, lime water most metallic salts, and gelatin.

Dose—1 to 2 ounces.

**Tinctura Cinchonæ Flavæ.**

| | |
|---|---|
| Yellow Cinchona Bark, in moderately fine powder .......................... | 4 ounces |
| Proof Spirit ..........................ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

Dose—½ to 2 drachms. (11 grains of Bark in 1 fluid drachm.)

## QUINIÆ SULPHAS

$(C_{20}H_{24}N_2O_2)_2H_2SO_4.7H_2O$,

is prepared according to the B.P. by mixing three fluid ounces of hydrochloric acid with ten pints of water, and placing one pound of yellow cinchona bark in coarse powder in a porcelain basin, and adding to it as much of the diluted hydrochloric acid as will render it thoroughly moist. After maceration, with occasional stirring for 24 hours, place the bark in a displacement apparatus and percolate with the diluted hydrochloric acid, until the solution which drops through is nearly destitute of bitter taste. Into this liquid pour 4 pints of solution of soda, agitate well, let the precipitate completely subside, decant the supernatant fluid, collect the precipitate on a filter and wash it with cold water until the washings cease to have colour. Transfer the precipitate to a porcelain dish containing a pint of water; and applying to this a heat of 200° F., gradually add diluted sulphuric acid until very nearly the whole precipitate has been dissolved, and a neutral liquid has been obtained. Filter the solution while hot, wash the filter with boiling hot distilled water, concentrate until a film remains on the surface of the solution and set aside to crystallise.

The crystals should be dried on filtering paper without the application of heat.

In this process the hydrochloric acid dissolves out the quinia and cinchonia as hydrochlorates, setting free kinic acid. The soda precipitates the alkaloids by combining with the acids. The precipitated alkaloids are then carefully treated with just enough of diluted sulphuric acid to obtain a perfectly neutral sulphate, when the sulphate of quinine crystallises out, being being much less soluble than the sulphate of cinchonine which remains in solution.

In making quinine on a larger scale this process is modified by the use of excess of lime instead of solution of soda. The precipitated alkaloids, together with the excess of lime, are washed and dried by pressure between calico, and the quinine is dissolved out from the cake by rectified spirit.

Sulphate of quinine is in silky crystals, slightly soluble in cold water (1 in 740), much more so in boiling water (1 in 30). It is also soluble in rectified spirit. It is exceedingly soluble in water acidulated with sulphuric acid, being thereby converted into the acid sulphate, $C_{20}H_{24}N_2O_2.H_2SO_4.7H_2O$.

Owing to its costliness sulphate of quinine is subjected to many adulterations:—1. Test for the presence of salicin by moistening a little with cold strong sulphuric acid, when it should not become red. The solution should then be heated gently, and if sugar, starch, gum, or other organic impurities be present, it will darken. 2. It should be tested for the presence of cinchonine by dissolving 10 grains in ½ ounce of water by the aid of 10 minims of B.P. diluted sulphuric acid, and adding a few drops of ammonia to precipitate the quinine; the whole should then be shaken up with ½ fluid ounce of pure ether and allowed to stand at rest, when the quinia dissolves, and any cinchonia present is seen as a crystalline matter floating on the surface of the lower stratum of fluid. If the upper stratum of ether be now carefully and entirely removed by a pipette and evaporated spontaneously in a weighed capsule, and, when dried, heated for a few minutes in the water bath, the residue of pure quinine should weigh 8·6 grains.

Sulphate of quinia is used in making the following:—

**Pilula Quiniæ.**

| | |
|---|---|
| Sulphate of Quinia .................... | 60 grains |
| Confection of Hips .................... | 20 grains |

Dose—2 to 10 grains (3 grains of Quinine in 4 grains).

### Tinctura Quiniæ.

| | |
|---|---|
| Sulphate of Quinia | 160 grains |
| Tincture of Orange Peel | 20 fluid ounces |

Dissolve with a gentle heat, and after 3 days filter.

Dose—½ to 2 drachms (1 grain of Quinine in 1 fluid drachm).

### Tinctura Quiniæ Ammoniata.

| | |
|---|---|
| Sulphate of Quinia | 160 grains |
| Solution of Ammonia | 2½ fluid ounces |
| Proof Spirit | 17½ fluid ounces |

Dissolve the Quinia in the Spirit by a gentle heat, and add the ammonia.

Dose—½ to 2 drachms (1 grain of Quinine in 1 fluid drachm).

Note.—This deposits on keeping, owing to loss of ammonia, the *excess* of which alone retains the quinia in solution.

### Vinum Quiniæ.

| | |
|---|---|
| Sulphate of Quinia | 20 grains |
| Citric Acid | 30 grains |
| Orange Wine | 20 fluid ounces |

Dissolve first the acid and then the Quinine in the wine, allow it to remain 3 days, shake occasionally, and filter.

Dose—½ to 1 ounce (1 grain of Quinine in 1 fluid ounce).

Quinia is also contained in Ferri et Quiniæ Citras, in which it exists as a slightly acid citrate to an amount equivalent to 16 per cent. of pure quinia.

## CINCHONÆ PALLIDÆ CORTEX,

**Pale Cinchona Bark.**—The bark of *Cinchona officinalis* (var. *Condaminea*), collected about Loxa, in Ecuador.

**Description.**—The finest, or "pale crown" bark, is in thin quills from 1-8th to ½ inch in diameter, twisted and often double. The thickness of the bark varies from that of paper up to about 1-10th of an inch. Externally it is dark grey splashed with silver grey, and on fine pieces are numerous large lichens, while the whole outside is cracked transversely at close intervals. Internally it is bright yellowish brown, and very fibrous. When broken the fibres are seen to be in the endophlœum only. Besides this we meet with "ashy crown" bark (the produce of *C. Macrocalyx*), which, together with several other varieties, should be carefully studied.

**Uses.**—As yellow bark, but not so rich in anti-periodic properties, although more astringent, owing to its containing more quino-tannic acid.

Dose, of the powder, 10 to 60 grains.

**Chemistry.**—Contains very little quinia, but from about ·5 to 1 per cent. of cinchonia and quinidia, chiefly the latter.

**Official Test.**—To be performed exactly as for yellow bark, only starting with 200 grains, and using chloroform instead of ether, when the residue should weigh at least one grain.

### Tinctura Cinchonæ Composita.

*(Huxham's Tincture of Bark.)*

| | |
|---|---|
| Pale Cinchona Bark, in moderately fine powder | 2 ounces |
| Bitter Orange Peel, bruised | 1 ounce |
| Serpentary Root, bruised | ½ ounce |
| Saffron | 60 grains |
| Cochineal, in powder | 30 grains |
| Proof Spirit ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

DOSE—½ to 2 drachms. (5½ grains of bark in 1 fluid drachm).

This tincture, under its popular name, was formerly in extensive demand. It may still be regarded as an admirable preparation. Pale cinchona bark is also contained in Mistura Ferri Aromatica.

## CINCHONÆ RUBRÆ CORTEX,

**Red Cinchona Bark.**—The bark of *Cinchona succirubra*, collected on the western slopes of the Chimborazo.

**Description.**—In flat or channelled pieces coated with their periderm, and sometimes reaching ½ inch in thickness. The inner surface is brick-red and fibrous, and the whole breaks with a short fibrous fracture. At present it is not extensively used, but it is being rapidly planted in India, and may soon be expected to be in larger demand.

**Uses.**—For quinine manufacture.

**Chemistry.**—Contains chiefly quinia and quinidia, with some cinchonia. According to the official test performed on 100 grains, and working with chloroform as for pale bark, it should yield not less than 1·5 per cent. of mixed alkaloids; but it usually contains much more than that, and about one-third of the whole is frequently quinia.

**CINCHONÆ LANCIFOLIÆ CORTEX, Columbian or Carthagena Bark.**—The bark of *C. lancifolia,* imported *via* Santa Fè and Carthagena. *Not official.*

**Uses.**—One of the chief, if not actually the principal source of the quinine manufacture in England. It is rich in alkaloids, but variable. It is imported both in "quills" and "flats."

The remaining bark which is used for quinine manufacture is that of *C. Pitayensis*, known in commerce as Pitayo bark. It comes from Columbia, and is usually imported in much broken fragments. It is also rich in alkaloids, quinine prevailing.

**Complete Analysis of Cinchona Bark for Alkaloids.**—The following is a more complete process than the official one, and has the additional advantage of rapidity when only pursued as far as the obtaining of the total mixed alkaloids. The second part involving separation is more tedious.

Mix 300 grains of powdered bark, dried at 212° F., with milk of lime (75 grains of slaked lime to 750 grains of water). Dry the mixture slowly and then boil it with 7 fluid ounces of rectified spirit. Pour off the clear liquid; boil again with half as much more alcohol; filter, and wash the powder with 3½ ounces more alcohol. From the mixed liquors precipitate the calcium as sulphate by a few drops of diluted sulphuric acid. Filter; distil off the spirit, and pour the residual liquid into a capsule, and heat it on a water bath, until the spirit is wholly expelled. Filter the remaining liquor, which contains all the alkaloids in the form of acid sulphates, and wash the residue (quinovic acid and fatty matter) with water, slightly acidulated with sulphuric acid. The filtrate and washings, reduced to about ½ fluid ounce, are now treated, while still warm, with caustic soda in slight excess. Wash the precipitate with a very little water; press it between folds of blotting paper, and dry on a water-bath. The weight, divided by three, gives the per-centage of the total alkaloids.

The dried alkaloids are then shaken up with ten times their weight of ether, which dissolves quinine and quinicine (A) and leaves cinchonine, cinchonidine, and quinidine (B), which may be treated as follows:—

The portion soluble in ether (A) is evaporated to dryness, and the residue dissolved in ten parts of proof spirit, acidulated with 1-20th of diluted sulphuric acid. The whole is warmed, and tincture of iodine added in excess, and the precipitate collected, washed, and dried at 100° F. One part of this precipitate equals ·565 parts of quinia. To the filtrate add a few drops of sulphurous acid; evaporate to remove the alcohol, and then add caustic soda, which will precipitate the quinicine, and any other amorphous alkaloid present.

The portion (B) is dissolved in 40 parts of hot water by the aid of a little diluted sulphuric acid, so as to produce perfectly neutral sulphates. On the addition of potassium iodide, the quinidine is precipitated, and the precipitate may be collected, dried, and weighed. To the filtrate Rochelle salt is added, and the precipitated tartrate of cinchonidine collected after 12 hours, dried and weighed; and, finally, cinchonine is precipitated from the filtrate by a slight excess of sodium hydrate, and washed and dried.

## IPECACUANHÆ RADIX,

Ipecacuanha Root, *Ipecacuan.*—The dried root of *Cephaëlis Ipecacuanha*, imported from Brazil.

**Botanical Source.**—The *Cephaëlis Ipecacuanha* is a small shrub with a creeping root, growing in the shady forests of tropical South America, from Rio de Janeiro to Pernambuco. The root of commerce is obtained chiefly from the Province of Matto Grosso.

**Collection.**—The root is collected by men called Poayeros, and afterwards dried in the sun. The collection goes on continuously, except during the rainy season.

**Description.**—In pieces of 3 or 4 inches inches in length, of a dusky grey or dull brownish colour. It is hard, breaks readily with a granular fracture, and it is white or greyish inside. When broken it is found to consist of a cortical portion, which constitutes 75 to 80 per cent. of the whole root, and a meditullium, which is tough and slender. The active portion is the cortical, and therefore the best quality is that showing the greatest amount of this portion. This being so easily separable, the root is often found with fragments of it detached. As met with in commerce, ipecacuanha root attains the maximum diameter of about 2-10ths of an inch, and its surface is covered with rings which penetrate in some cases almost to the wood, from which circumstance its popular name of *annulated* is derived. The inferior quality, distinguished as "New Granada Ipecacuanha," is sometimes imported, which is larger in size and has a distinctly radiate arrangement of the meditullium.

**Uses.**—In small doses it is an expectorant and diaphoretic; in large doses an emetic. It is found useful in chronic dysentery. When given as an emetic it is not so depressing as *antimonium tartaratum*, but it is not so active an emetic as zinc sulphate.

Dose as an expectorant ¼ to 2 grains; as an emetic 15 to 30 grains.

**Chemistry.**—Ipecacuanha contains an alkaloid called *emetine*, combined with ipecacuanhic acid. It also yields a small portion of a fetid volatile oil, to which its faint nauseous odour is due. According to Lefort the formula of emetine is $C_{30}H_{44}N_2O_8$. It is a colourless and amorphous alkaloid, melting at 150° F., very soluble in chloroform and alcohol, but slightly in ether and water; dissolves readily in acids, forming soluble salts, but its nitrate is characterised by its great insolubility, and its tannate is still more insoluble. Emetine may be obtained by extracting the powdered root with alcohol, evaporating the spirit, taking up the residue with water slightly acidulated with hydrochloric acid, then adding an excess of potassium hydrate and shaking up with chloroform. According to Reich the formula of this alkaloid should be $C_{20}H_{30}N_2O_5$, but that of Lefort, above given, is more modern. Ipecacuanhic acid is a reddish brown bitter substance, closely allied to kinic acid, and usually regarded as being a glucoside. Besides the above important principles the root is found to contain small quantities of resin, sugar, gum, pectin, and starch.

**Pilula Ipecacuanhæ cum Scilla.** (*Vide* p. 53.)

**Pulvis Ipecacuanhæ Compositus** (1 in 10). (*Vide* p. 53.)

**Trochisci Ipecacuanhæ.**

| | | |
|---|---|---|
| Ipecacuanha, in powder | | 180 grains |
| Refined sugar, in powder | | 25 ounces |
| Gum Acacia, in powder | | 1 ounce |
| Mucilage of Gum Acacia | | 2 fluid ounces |
| Distilled Water | q.s. | 1 fluid ounce. |

Divide into 720 lozenges. (¼ grain in each.)

Dose—1 to 3.

**Vinum Ipecacuanhæ.**

| | | |
|---|---|---|
| Ipecacuanha, bruised | | 1 ounce |
| Sherry | ad. | 20 fluid ounces |

Macerate 7 days, and filter.

Dose—Expectorant, 5 to 40 minims; emetic, 3 to 6 drachms. (1 grain of Ipecacuanha in 22 minims.)

Ipecacuanha wine loses power on keeping; much of the emetine being deposited along with potassium bitartrate. An Acetum Ipecacuanhæ has been recommended as a more stable preparation.

Ipecacuanha also enters into the composition of the following:—Pilula Conii Composita (1 in 6).

Trochisci Morphiæ et Ipecacuanhæ (1-12th grain in each). (*Vide* page 45.)

**Substitutions.**—1. *Striated Ipecacuanha* is the root of *Psychotria emetica*, and is thicker than the Ipecacuanha, and has marked longitudinal furrows instead of rings on its sides. It is not easily broken but remains moist and tough, and when cut exhibits a dull violet colour.

2. *Undulated Ipecacuanha* is the root of *Richardsonia scabra*. It is rough and knotted, and deep iron-grey in colour. Its bark is thick and brittle, and noticeably light coloured and farinaceous; the meditullium is slender, but strong and flexible. It is never marked with rings.

NOTE.—For a ready method of estimating the strength of a sample of Ipecacuanha, see the Author's work on Pharmaceutical Chemistry, page 623.

## NATURAL ORDER.—VALERIANACEÆ.

Usually herbs with opposite leaves. Calyx, superior, 4-toothed or pappose; corolla, tubular and epigynous, often gibbous at the base; stamens, 1 to 5, free and epipetalous; ovary, inferior 3-celled, with 2 cells usually abortive; stigma, 2 or 3 lobed; fruit, dry indehiscent; seeds, exalbuminous.

**VALERIANÆ RADIX, Valerian Root.**—The dried root of *Valeriana officinalis* from indigenous plants, and others cultivated in Britain.

**Botanical Source.**—The *V. officinalis* is a perennial herb with imparipinnate leaves and lanceolate leaflets; inflorescence a corymbose cyme; calyx persistent; corolla hypocrateriform and gibbous at the base; fruit 1-celled and 1-seeded, crowned by a feathery pappus.

**Collection.**—The root is derived principally from plants cultivated near Chesterfield, in Derbyshire.

**Description.**—A short rhizome, yellowish white or brown in colour, with numerous dark brown fibrous roots about 2 or 3 inches long. The odour is penetrating and fetid, and the taste bitter. The rootlets are generally 3 to 4 inches long, and slender, rarely attaining 1-10th of an inch in diameter.

**Uses.**—A stimulant, anti-spasmodic, and nervine tonic. Useful in hysteria and its allies, chorea and epilepsy, but its action is rather feeble, and the result is not always satisfactory.

**Chemistry.**—The active principle is a volatile oil, of which the root yields from ½ to 2 per cent. This oil contains 5 per cent. of valerianic acid, $HC_5H_9O_2$. It also contains 25 per cent. of a hydrocarbon resembling oil of turpentine, called *valerene*, $C_5H_8$, as well as *valerol*, $C_6H_{10}O$, and *stearopten*, $C_{10}H_{18}O$, indentical with Dryobalanops camphor. Exposed to the air, valerol is slowly converted into valerianic acid, a reaction which is instantly produced by potassium hydrate.

$$C_6H_{10}O+3KHO+H_2O=K_2CO_3+3H_2+KC_5H_9O_2.$$

Besides the volatile oil, Valerian Root contains 6 per cent. of resin, 12 of extractive matter, and a little sugar and malic acid.

### Infusum Valerianæ.

| | |
|---|---|
| Valerian Root, bruised ................ | 120 grains |
| Boiling Distilled Water ................ | 10 fluid ounces |

Infuse 1 hour.

Dose—1 to 2 ounces.

### Tinctura Valerianæ.

| | |
|---|---|
| Valerian Root, in coarse powder ........ | 2½ ounces |
| Proof Spirit ........................ad. | 20 fluid ounces |

Dose—1 to 2 drachms.

### Tinctura Valerianæ Ammoniata.

| | |
|---|---|
| Valerian Root, in coarse powder ........ | 2½ ounces |
| Aromatic Spirit of Ammonia ........ad. | 20 fluid ounces |

Dose—½ to 1 drachm.

## NATURAL ORDER.—COMPOSITÆ.

Herbs or shrubs with exstipulate leaves. Flowers (florets) in capitula surrounded by an involucre of bracts. Calyx superior, frequently pappose; corolla, tubular or ligulate; stamens, 5 epipetalous, and having syngenesious anthers; ovary, inferior; fruit, a dry indehiscent, 1-celled 1-seeded cypsela (an achænium, inferior and compound); seed, solitary and exalbuminous.

Of this order, De Candolle makes three sub-orders:—

1. *Tubulifloræ*, with florets of the ray usually ligulate, and either unisexual or neuter, and the florets of the disc tubular and hermaphrodite. Examples:—*Anacyclus, Anthemis, Arnica, Artemisia, Carthamus, Inula, Matricaria and Tussilago.*

2. *Labiatifloræ*, with the unisexual florets labiate. No medicinal examples.

3. *Liguliforæ*, with all florets ligulate and perfect. Examples:—*Cichorium, Lactuca and Taraxacum.*

**PYRETHRI RADIX, Pellitory Root,** *Pellitory of Spain.*—The dried root of *Anacyclus Pyrethrum*, imported from the Levant.

**Botanical Source.**—A low perennial, with small divided leaves and capitulum resembling that of the ox-eye daisy.

**Collection.**—The root is chiefly collected in Algeria and exported from Tunis *via* Leghorn and Egypt.

**Description.**—In pieces about the length and thickness of the little finger, cylindrical or tapering off, having a thick brown bark studded with shining points, and only a few hair-like rootlets. Breaks with a resinous fracture, and exhibits internally a radiate structure; has an aromatic smell with a pungent taste, exciting a tingling sensation of the lips and tongue and a flow of saliva. It is very liable to perforations, caused by the attacks of insects.

**Use.**—As a sialogogue for the relief of tooth-ache.

**Chemistry.**—It contains a little volatile oil, sugar, gum, tannic acid, and a resinous matter called *pyrethrin*, which has not yet been fully examined.

**Tinctura Pyrethri.**

| | |
|---|---|
| Pellitory Root, in coarse powder ........ | 4 ounces |
| Rectified Spirit ....................ad. | 20 fluid ounces |

Macerate 48 hours, and percolate.

(12 grains of Pellitory Root to 1 fluid drachm.)

**Substitutions.**—In Germany and Russia the root of *Anacyclus officinarum*, which is an annual herb cultivated in Russia, is used instead of the pellitory already described. It is light grey in colour, and only half the thickness of our bark, being besides abundantly covered with the remains of sticks and leaves.

**ANTHEMIDIS FLORES, Chamomile Flowers.**—The dried single or double flower heads of *Anthemis nobilis*, from plants wild and cultivated in England.

**Botanical Source.**—The *Anthemis nobilis* is a perennial herb growing not more than a foot high, and much branched and leafy. The leaves are compound bipinnate with linear subulate leaflets. The capitula are terminal and *solitary*, with a convex yellow disc and membranous scales; fruit without a pappus.

**Collection.**—The flowers are gathered from plants cultivated chiefly at Mitcham, and dried by gentle artificial heat.

**Description.**—The single flower heads contain both white ligulate and yellow tubular florets, while the double have ligulate and female florets only. The receptacle in both cases is solid, conical, and about ¼ inch high, and covered with narrow chaffy scales. The flowers possess a powerful aroma and have a bitter taste.

**Uses.**—A stimulant, aromatic tonic. In large doses diaphoretic and even emetic. Useful as a stomachic in dyspepsia and flatulence.

**Chemistry.**—Chamomiles yield about a half per cent. of essential oil, which when fresh is pale blue, but becomes brownish by keeping. This may be viewed as a mixture of butylic and amylic angelate and valerate. These bodies are easily decomposed by the action of potassium hydrate forming potassium angelate. In practice the oil is distilled from the entire plant. Besides the oil, chamomiles contain a small quantity of a bitter acrid principle, apparently a glucoside.

### Extractum Anthemidis.

| | |
|---|---|
| Chamomile Flowers .................... | 16 ounces |
| Oil of Chamomile .................... | 15 minims |
| Distilled Water .................... | 1 gallon |

(100 lbs. of flowers yield about 42 lbs. of extract.)

Dose—2 to 10 grains.

### Infusum Anthemidis.

| | |
|---|---|
| Chamomile Flowers .................... | ½ ounce |
| Boiling Distilled Water .................... | 10 fluid ounces |

Infuse 15 minutes, in a covered vessel, and strain.

*Incompatibles*—Salts of iron, mercury, silver, and lead.

Dose—1 to 4 ounces.

### Oleum Anthemidis.

The oil distilled in Britain from the flowers.

**Substitutions.**—1. The flower heads of *Chrysanthemum Parthenium*, or feverfew, which have flat or only slightly convex receptacles and all the florets ligulate. The scales on the receptacle are not membranous.

2. The flower heads of *Matricaria Chamomilla* used in Germany under the name of common chamomile. The flower heads are single; not bitter, and the receptacle is very conical, hollow, and devoid of scales.

**ARNICÆ RADIX, Arnica Root.**—The dried rhizome and rootlets of *Arnica montana*, collected in mountainous parts of Middle and Southern Europe.

**Botanical Source.**—*Arnica montana* is a perennial herb with stems about a foot high. The radical leaves are simple, obovate, and entire; the cauline leaves rarely more than two small pairs; inflorescence in bold capitula, and never more than three on one stalk; florets of the ray, yellow, ligulate, and in one whorl only; florets of the disc, tubular, yellow, and hermaphrodite; fruit, cylindrical, with a pappus consisting of one whorl and rigid hairs.

**Description.** — Slender, contorted; dark brown rhizome, 1 to 3 inches long, and 2 to 3 lines thick, having on its under side an abundance of wiry roots, 3 or 4 inches long, and on its upper side the remains of coriaceous leaves. It has an acrid taste and faint aromatic odour.

**Uses.** — Externally applied it is feebly irritant; internally, stimulant and diaphoretic. The tincture is used as a popular application to bruises, but its efficacy for this purpose is somewhat hypothetical.

**Chemistry.**—The root contains about ⅕ per cent. of volatile oil, having the formula, $C_6H_9O$, but its active principle is *arnicin*, $C_{20}H_{30}O_4$, a yellow amorphous body with an acrid taste, slightly soluble in water, freely in alcohol and ether, and in alkaline solutions. It is presumed to be a glucoside as it is decomposable by dilute acids, but this has not yet been definitely proved. It may be precipitated from its spirituous solution both by tannic acid and water.

**Tinctura Arnicæ.**

| | |
|---|---|
| Arnica Root, in coarse powder.......... | 1 ounce |
| Rectified Spirit ....................ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

Dose—1 to 2 drachms. (2¾ grains of Arnica in 1 fluid drachm.)

**Substitutions.**—The root of *Geum urbanum*, a herb belonging to the Rosaceæ. It is thicker than the rhizome of arnica, and it is, moreover, not a rhizome, but a true root covered on all sides by rootlets.

**ARNICÆ FLORES.**—The flowers of the same plant, formerly used in making the tincture. They are said to be richer in *arnicin* than the root now employed.

A stronger and better preparation is a tincture made with equal parts of the flowers as well as the root of arnica.

**SANTONICA, Wormseed, *Semen-contra*.**—The unexpanded flower heads of a species of *Artemisia*, imported from Russia.

**Botanical Source.**—This has lately been described as *Artemisia Cina*, but was formerly considered to be *Artemisia maritima*. It is a low, shrubby, aromatic plant, having for its inflorescence a number of very minute capitula, arranged in a close panicle.

**Collection.**—The unexpanded flower heads are collected on the Steppes of Kirghiz, in the northern part of Turkestan, and imported *via* Moscow and St. Petersburgh.

**Description.**—In good samples, this drug should consist of entire, unexpanded capitula, very minute in size, and requiring about 90 to weigh one grain. A mixture of stalks and leaves is found in inferior samples. The flower heads are of an oblong form, 1-10th of an inch long, yellowish when new, and brownish when old. Rubbed in the hand they exhale a powerful odour, somewhat between oil of cajuput and camphor.

**Uses.**—Santonin is a vermicide, being active against the round and thread worms, but not against tænia. The dose is 2 to 6 grains in powder, or dissolved in oil and borax.

**Chemistry.**—Santonica yields about 1 per cent. of volatile oil, and an active principle called *santonin*, which is a glucoside having the formula $C_{15}H_{18}O_3$.

Santonin B.P. is prepared by boiling 1 lb. of santonica with 1 gallon of water and 5 ounces of slaked lime for 1 hour; strain and boil the flowers again with ½ gallon of water and 2 ounces of slaked lime for ½ hour; strain, mix the two liquors, filter and evaporate to 2½ pints. Add to the hot liquid, hydrochloric acid in slight excess, and set aside for 5 days. Remove any floating oily matter, decant the fluid, and collect the precipitate on a filter and wash it with cold water until it is free from acid, and then with a mixture of ½ fluid ounce of solution of ammonia and 5 ounces of water, and lastly with cold water, until the washings pass colourless. Press and dry the residue. Boil for 10 minutes with 60 grains of purified animal charcoal, and 9 ounces of rectified spirit. Filter; wash the charcoal with an ounce of boiling spirit, adding the washings to filtrate, and set aside for two days to crystallise. Protect the crystals from the light. In this process the santonin is extracted as a soluble calcium santonate; this is decomposed and the santonin precipitated by hydrochloric acid, the resinous matters being washed away by the ammonia water. It is then redissolved in boiling spirit, decolorised by animal charcoal, and on cooling the santonin crystallises.

**Characters and Tests.**—In colourless tubular crystals, slightly bitter, fusible and subliming at a gentle heat. It is dimorphous, and on exposure to light it undergoes a crystalline change, which renders it yellow. It is very slightly soluble in cold and even boiling water, but readily soluble in chloroform and boiling rectified spirit. *It is insoluble in dilute acids.* Santonin has been viewed as an anhydride of santoninic acid, $C_{15}H_{20}O_4$.

**INULÆ RADIX, Elecampane Root.**—The dried root of *Inula Helenium*, from Central and Southern Europe, cultivated in England.

**Botanical Source.**—It is a perennial herb with large ovate-cordate, acute leaves, downy on the under surface; inflorescence, large bright yellow capitulum, having small florets of the ray, and hermaphrodite florets of the disc.

**Collection.**—The roots should be collected from plants not younger than two, nor older than three years. They are sometimes dried entire, but when large they are variously sliced.

**Uses.**—Aromatic tonic, diaphoretic and expectorant.

**Chemistry.**—Elecampane contains 36 per cent. of bitter extractive, and a peculiar kind of starch termed inulin. This body has the same composition as starch, $C_6H_{10}O_5$, and is usually found in the roots of the Compositæ. It is a white tasteless powder, turned *yellow* on the addition of tincture of iodine. It is almost insoluble in cold but readily soluble in boiling water, from which it partly separates again on cooling. With dilute acids it is converted into dextrin and sugar, and by the action of nitric acid it is converted into oxalic and acetic acids. It may be precipitated from its solution by alcohol. Elecampane root also contains a neutral crystalline principle called *helenin*.

*Not official*, but made into a decoction of ¾ ounce to the pint.

Dose, 1 to 2 ounces.

TARAXACI RADIX.—The fresh and dried roots of *Taraxacum Dens Leonis*, from meadows and pastures in Britain and elsewhere.

**Botanical Source.**—*Taraxacum officinale*, *Leontodon Taraxacum*, or *Taraxacum Dens Leonis*, is a herb with a milky juice; radical, pinnatifid, and runcinate leaves; inflorescence a bold yellow capitulum, supported on a perfectly glabrous scape, well known as the common dandelion.

**Collection.**—The roots are to be dug up, according to the British Pharmacopœia, between September and February, but they are generally considered to be in perfection for making extract in the month of November. Some discrepancy of opinion however exists upon this point.

**Description.**—The dried root is dark brown, with shrivelled wrinkles running longitudinally often in a spiral manner. It is ½ an inch or less in thickness, and breaks easily with a short corky fracture, showing a thick white cortical portion surrounding a woody column, which is very porous, without rays. It is inodorous and bitter in taste. It is very liable to the attacks of maggots.

**Uses.**—Employed as a mild laxative in liver disorders, and it is popularly supposed to be diuretic in action. Its roasted root is sometimes used in the adulteration of coffee.

**Chemistry.**—The dried root contains 24 per cent. of inulin, and about 20 per cent. of sugar. It also contains an acrid resin, a colourless amorphous bitter substance called *taraxacin*, which may be obtained by boiling the milky juice of the fresh root with water and evaporating, when it deposits in warty crystals. The fresh root also contains a substance called *taraxacerin*, $C_8H_{16}O$, a substance resembling *lactucerin*. The leaves and stocks of dandelion yield a peculiar sugar called *inosite*, $C_6H_{12}O_6.2H_2O$.

**Decoctum Taraxaci.**

| | |
|---|---|
| Dried Dandelion Root, sliced and bruised | 1 ounce |
| Distilled Water ...................... | 1 pint |

Boil 10 minutes; make up product to 20 fluid ounces.

DOSE—2 to 4 ounces.

**Extractum Taraxaci.**

The expressed juice of fresh Dandelion Root, evaporated at 160° to an extract, after the feculence has deposited.

100 lbs. of root yield 25 lbs. dried; 30 lbs. of juice, or 8 lbs. of extract.

Dose—5 to 30 grains.

**Succus Taraxaci.**

| | |
|---|---|
| Dandelion Juice | 3 pints |
| Rectified Spirit | 1 pint |

Filter after standing 7 days.

Dose—1 drachm to 2 drachms. (2 drachms are equal to ½ drachm of extract, or 6 drachms of fresh root.)

**Substitutions.**—The roots of *Leontodon hispidus* (common hawkbit). The leaves of the hawkbit are pilose, while those of the dandelion are glabrous. The flower stalk of the hawkbit is branched and the fresh root does not show any quantity of milky juice.

LACTUCA VIROSA.—The fresh flowering herb of *Lactuca virosa*, indigenous.

**Botanical Source.**—It is a biennial herb with an acrid milky juice. Radical leaves, obovate and undivided, with a prickly keel, but otherwise nearly smooth, and finely dented; cauline leaves, often auricled and half amplexicaul; inflorescence, a panicle of capitula; flowers, pale yellow. The plant has a rank smell, and red spots on the stem.

**Uses.**—A soporific, but not active.

**Chemistry.**—The plant when wounded yields a white milky juice, which when exposed to the air rapidly hardens to small yellow-brown masses, which are known as *lactucarium* or lettuce-opium. This substance, which is not official, is specially collected in Rhenish Prussia, by cutting the stem just before the plant flowers, and collecting the juice from the wounded top by the finger and transferring it to earthen cups. Formerly the *annual* plant was cultivated near Edinburgh and the juice collected in tin vessels. Lactucarium contains several substances of which the following are the principal:—

1. *Lactucerin*, $C_{16}H_{26}O$, this may be obtained by extraction with boiling alcohol in the form of colourless needles insoluble in water, but soluble in ether and in oils. Good *lactucarium* yields 59 per cent. of this body.

2. *Lactucin*, $C_{11}H_{12}O_3.H_2O$, in pearly scales, soluble in acetic acid but insoluble in ether.

In addition to those we find albumen, gum, oxalic, citric, malic and succinic acids, sugar, mannite and metallic solids.

**Extractum Lactucæ.**

The expressed juice of the flowering herb of lettuce, evaporated at 160° to an extract.

(100 lbs. of the plant yield 52 lbs. of juice, or 5½ lbs. of extract.)

Dose—5 to 15 grains.

## NATURAL ORDER.—LOBELIACEÆ.

Herbs or shrubs with a milky juice; corolla irregular; stamens, 5 syngenesious; ovary inferior, 3-celled; fruit capsular.

**LOBELIA.**—The dried flowering herb of *Lobelia inflata* from North America, from Canada to Carolina.

**Botanical Source.**—The *Lobelia inflata* is an annual herb, growing along the roadsides in the eastern part of North America.

**Collection.**—The herb is collected by the sect called Shakers in August and September; dried, and chopped before it is quite dry, and neatly trimmed in the form of rectangular cakes. The drying is then finished, and the cakes are usually wrapped in blue paper.

**Description.**—As met with dry, lobelia has an angular stem, alternate ovate and dented leaves, hairy beneath. The fruits in racemes, consisting of membranous capsules, ovoid in shape, inflated and 10-ribbed. Inside the fruits are numerous minute seeds about 1-50th of an inch long, dark brown in colour, ovate-oblong in shape, with a reticulated testa. The characters of the seeds under a microscope form an excellent guide to recognition.

**Uses.**—A powerful anti-spasmodic and depressive remedy, and useful in spasmodic asthma and tetanus. It produces nausea, coupled with vomiting, cold sweats, muscular relaxations, and causes death by collapse and finally coma.

**Chemistry.**—The active principle is due to a volatile alkaloid of an oily consistence, smelling like tobacco. It is called *lobelina*, and is soluble in water and more so in alcohol and ether. It may be isolated by making a decoction of the plant with acidulated water, precipitating with sodium phospho-molybdate, and distilling the precipitate with baryta water. It forms crystallisable salts with acids. Lobelia also contains a little volatile oil, resin and gum, and an acrid principle called *lobelacrin*, which may be isolated by making a tincture and distilling it with animal charcoal. The charcoal retains the acrid principle, and after washing with water it is dissolved out by boiling spirit. It crystallises in warty tufts, and is freely soluble in ether and chloroform.

**Tinctura Lobeliæ.**

| | |
|---|---|
| Lobelia, in coarse powder .............. | 2½ ounces |
| Proof Spirit ........................ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

Dose—10 to 30 minims. (7 grains of Lobelia in 1 fluid drachm.)

*Antidotes*—Internal and external stimulants.

**Tinctura Lobeliæ Ætherea.**

| | |
|---|---|
| Lobelia, in coarse powder .............. | 2½ ounces |
| Spirit of Ether ....................ad. | 20 fluid ounces |

Macerate 7 days, then strain, press, and filter.

Dose—10 to 30 minims. (7 grains of Lobelia in 1 fluid drachm.)

## SUB-DIVISION II.—HYPOSTAMINEÆ.

## NATURAL ORDER.—ERICACEÆ.

Evergreen shrubby plants; leaves opposite or whorled, exstipulate; calyx, persistent; corolla, monopetalous and hypogynous; stamens, equal in number to or double the divisions of the corolla; anthers, appendiculate; ovary, superior; placentation axile; fruit, capsular; seeds, numerous and albuminous.

## UVÆ URSI FOLIA, Bearberry Leaves

—The dried leaves of *Arctostaphylos Uva Ursi* from Northern Europe, North Britain, and North America.

**Botanical Source.**—The bearberry is a small evergreen shrub bearing terminal clusters of flowers and scarlet globose berries.

**Collection.**—The leaves are taken in September and October usually from indigenous plants.

**Description.**—Small dark green coriaceous and glabrous leaves, not exceeding 1 inch in length by 3-8th of an inch in breadth, obovate in shape, with short petiole. The upper surface is shining and deeply impressed with a network of veins and much reticulated beneath.

**Uses.**—As a simple astringent in diarrhœa; also in some affections of the bladder and kidneys.

**Chemistry.**—Uva Ursi leaves contain 36 per cent. of tannic acid and 1½ per cent. of gallic acid. They also yield a bitter neutral substance called *arbutin*, $C_{24}H_{32}O_{14}.H_2O$. This is very soluble in water and alcohol, but only slightly so in ether. It may be obtained by treating a decoction with basic acetate of lead, filtering out the precipitated tannate and gallate of lead, removing the excess of lead from the filtrate by sulphuretted hydrogen and then concentrating and crystallising the subsidiary glucoside, convertible by boiling with a dilute acid into hydro-quinone, $C_6H_6O_2$, and glucose. By oxidation it is convertible into *quinone*, $C_6H_4O_2$, which when heated evolves its characteristic odour and a solution stains the skin yellow. Another bitter amorphous substance called *ericolin*, may be obtained from the mother liquor after the crystallisation of the arbutin. Its formula is $C_{34}H_{56}O_{21}$. As the leaves contain tannic acid the decoction may be precipitated by salts of iron.

### Infusum Uvæ Ursi.

| | |
|---|---|
| Bearberry Leaves, bruised.............. | ½ ounce |
| Boiling Distilled Water................. | 10 fluid ounces |

Infuse in a covered vessel for 2 hours, and strain.

*Incompatibles*—Alkalies and their carbonates; lime water, and most metallic salts; Decoctum Cinchonæ.

DOSE—1 to 2 ounces.

**Substitutions.**—The leaves of the red whortleberry, *Vaccinium Vitis-Idoea*, which are dotted on the under surface, and crenate towards the apex; also the leaves of the common box (*Buxus sempervirens*).

## SUB-DIVISION III.—EPIPETALÆ.

## NATURAL ORDER.—SAPOTACEÆ.

**GUTTA-PERCHA.**—The concrete juice of *Isonandra gutta* from the East Indian Archipelago.

**Botanical Source.**—The *I. gutta* is a bold evergreen tree, a native of Borneo, Sumatra and Singapore, at the latter of which it is now extinct, owing to the wasteful manner of its collection.

**Collection.**—The tree is simply felled by the Malays and the juice collected in cocoa-nut shells and then pressed into blocks of about 5 lbs. weight each. When imported to this country it is softened in hot water, torn into shreds by machinery, and then while still soft pressed together again.

**Description.**—In light brown or chocolate flexible but inelastic pieces. Insoluble in water, alcohol, dilute acids and alkalies or fixed oils, but soluble in ether, benzol, chloroform, carbon disulphide and volatile oils. Sp. gr. ·979.

**Uses.**—Employed in making the official preparation *Charta Sinapis.*

**Chemistry.**—Gutta-percha softens at 113° F., and at 212° can be easily moulded, and is very adhesive when heated dry. It is a non-conductor of electricity and becomes negatively electrified when rubbed. Crude gutta contains about 75 to 82 per cent. of a terpene called *caoutchin*, $C_{20}H_{32}$, which is solid, white, soluble in ether, benzol and chloroform, but insoluble in alcohol and only fusible at 300° F. The remainder is built up of two resins: viz., a white one having the formula $C_{10}H_{16}O$ or $C_{20}H_{32}O_2$, which is crystalline; and a yellow one $C_{20}H_{32}O$, which is amorphous. Both are soluble in boiling alcohol. Crude gutta by exposure to the light gradually oxidises to these resins and becomes brittle, but keeps well under water in the dark.

**Liquor Gutta Percha.**

| | |
|---|---|
| Gutta Percha, in thin slices ............ | 1 ounce |
| Chloroform .......................... | 8 fluid ounces |
| Carbonate of Lead, in fine powder ...... | 1 ounce |

Dissolve the Gutta-percha in 6 ounces of Chloroform in a stoppered bottle, add the Carbonate of Lead, previously mixed with the remaining Chloroform, and after shaking several times, allow the insoluble matter to subside. Lastly, decant the clear liquid, and keep it in a stoppered bottle.

The action of the plumbic carbonate is merely mechanical to separate the small portion of flocculent matter insoluble in the chloroform.

## NATURAL ORDER.—STYRACEÆ.

**BENZOINUM**, Benzoin, *Gum Benjamin.*—A balsamic resin from the stem of *Styrax Benzoin*, imported from Siam and Sumatra.

**Botanical Source.**—*Styrax Benzoin* is a tree with a thick stem, indigenous to Java and Sumatra.

**Collection.** — The resin is obtained by making incisions in the trees, when seven years old. It exudes and is scraped off with a knife. This process is carried on for about ten years, when the tree is cut down, and an inferior variety is obtained by splitting and scraping. Siamese benzoin is obtained by cutting the bark and allowing the resin to concrete between it and the wood and then stripping the tree.

**Description.**—Siamese benzoin consists of a mass of flattened tears of an opaque milk-white resin, loosely agglutinated. It is very brittle, and softens in the mouth. It fuses at 167° and evolves fumes of benzoic acid. Sumatra benzoin is in cubic blocks of greyish tint, containing opaque tears of a greyish resin, mixed with fragments of wood. In inferior samples the tears are almost entirely absent. Its odour is more feeble than the Siamese. It melts between 185° and 203°, and is much inferior in value to the Siamese.

**Uses.**—Chiefly for making incense. It acts medicinally as an active stimulant. It also lessens the tendency of fats to become rancid.

**Chemistry.**—The active principle of benzoin is benzoic acid, which exists to the extent of from 14 to 20 per cent. It may be obtained by sublimation and also by boiling with calcium hydrate and water, and precipitating benzoic acid by concentrating the solution, adding hydrochloric acid. An alcoholic solution of benzoin is coloured a dark brownish green by the addition of ferric chloride, but a watery decoction is unaffected. Cold, strong sulphuric acid dissolves benzoin, producing a beautiful carmine colour, and on the addition of water characteristic crystals of benzoic acid separate.

**Adeps Benzoatus.**

10 grains to 1 ounce. Used in the preparation of the four B.P. suppositories, and some pharmacopœial ointments.

**Tinctura Benzoini Composita.** (*Friar's Balsam.*)

| | |
|---|---|
| Benzoin, in coarse powder | 2 ounces |
| Prepared Storax | 1½ ounce |
| Balsam of Tolu | ½ ounce |
| Socotrine Aloes | 160 grains |
| Rectified Spirit | ad. 20 fluid ounces |

Macerate 7 days, then filter.

Dose—½ to 1 drachm, triturated with mucilage. As a lotion, 1 drachm to 5 ounces of rose water, adding the water to the tincture.

**Specially Distinctive Tests.**—*Siamese* benzoin is—

1. Completely soluble in chloroform, but imperfectly in ether.

2. Extracted by petroleum spirit (boiling under 100° F.) and the filtered solution evaporated, a residue is obtained which is coloured cherry-red by sulphuric acid.

3. Heated with sulphuric acid and potassium dichromate, it evolves no odour of benzoic aldehyd.

*Sumatra* benzoin sometimes does give a little odour with the last test.

**Acidum Benzoicum**, B.P. ($HC_7H_5O_2$), is prepared as already stated, by sublimation or by the wet process with lime. It is also manufactured artificially from *naphthalin*, $C_{10}H_8$, which is treated with nitric acid, and thus converted into *phthalic acid*, $H_2C_8H_4O_4$. By heating with calcium hydrate to about 650° F. the calcium phthalate formed is converted into calcium carbonate and calcium benzoate, from which latter the acid is liberated by the action of hydrochloric acid.

Benzoic acid is in light feathery crystals, having usually a slight odour of benzoin. It is slightly soluble in water (1 in 200) and more so in boiling water, and readily in rectified spirit and alkalies, forming salts which are freely soluble. It melts at 248° F., boils at 462° F., and then volatilises. It gives a flesh-colour precipitate with ferric chloride, which when filtered and washed, and treated in the filter with diluted ammonia, yields a solution of ammonium benzoate, which deposits crystals of benzoic acid on the addition of hydrochloric acid.

The dose is 10 to 30 grains.

Benzoic acid enters into the composition of Tinctura Camphoræ Composita, Tinctura Opii Ammoniata, and is used in the preparation of Ammonium Benzoate.

## NATURAL ORDER.—LOGANIACEÆ.

**NUX VOMICA, Poison Nut.**—The seeds of *Strychnos Nux vomica*, from Coromandel and other parts of India.

**Botanical Source.**—The *Strychnos Nux vomica* is a moderately sized tree, indigenous especially to the Coast districts of India.

**Description.**—It is a greyish disc-like seed, about 1 inch in diameter and a ¼ inch in thickness, covered with very short satiny hairs. It is convex on the ventral surface and slightly concave on the dorsal. In the centre there is a scar, which is the hilum, from which the raphè runs as a faintly projecting line to a small protuberance on the edge.

**Uses.**—Owing to the presence of strychnia, it is, like that alkaloid, a nervine tonic, only in a smaller degree; but, from the variation in the amount of alkaloids present in different samples, its preparations are uncertain in action compared with that of *liquor strychniæ.*

**Chemistry.** — The seeds contain two principal alkaloids—*Strychnia* (¼ to ½ per cent.), and *brucia* (from 0·5 to 1 per cent.), and one of lesser importance called *igasuria*. These proportions appear to vary.

**Strychnia**, $C_{21}H_{22}N_2O_2$, is obtained, according to the B.P. by subjecting 1 lb. of nux vomica for two hours to steam, then drying rapidly and grinding in a coffee mill. Digest the powder at a gentle heat for twelve hours with two pints of rectified spirit and one of water; strain through linen, express strongly, and repeat the process twice. Distil off the spirit from the mixed fluids; evaporate the watery residue to about 16 ounces and filter when cold. Add now 180 grains of acetate of lead previously dissolved in distilled water, so long as it occasions any precipitate; filter; wash the precipitate with 10 ounces of cold water, adding the washings to the filtrate; evaporate the clear liquid to 8 ounces, and when it has cooled add solution of ammonia in slight excess, stirring freely. Let the mixture stand at the ordinary temperature for twelve hours; collect the precipitate on a filter, wash it once with a few ounces of cold distilled water, dry it in the vapour bath and boil it with successive portions of rectified spirit till the fluid scarcely tastes bitter. Distil off most of the spirit, evaporate the residue to the bulk of about ½ ounce, and set it aside to cool. Cautiously pour off the yellowish mother liquor (which contains the brucia and igasuria) from the white crust of strychnia which adheres to the vessel. Throw the crust on a paper filter, wash it with a mixture of two parts of rectified spirit and one of water, till the washings cease to become red on the addition of nitric acid (absence of brucia); finally dissolve it by boiling it with an ounce of rectified spirit and set aside to crystallise. More crystals may be obtained by evaporating the mother liquor.

The alcohol extracts the alkaloids as igasurates. The addition of plumbic acetate forms plumbic igasurate and liberates acetates of strychnia and brucia. The ammonia precipitates both alkaloids, which are afterwards separated by fractional crystallisation from boiling rectified spirit, the strychnia crystallising out and leaving the brucia in solution.

Strychnia is in rectangular prisms, colourless and inodorous, slightly soluble in cold water (1 in 6700) more so in boiling water (1 in 2500). It is soluble in boiling rectified spirit, but not in absolute alcohol or ether, and it is very soluble in chloroform. Fragments of strychnia dissolve in cold strong sulphuric acid without colour, but the addition of a crystal of potassium dichromate causes a beautiful evanescent violet. A similar effect may be produced by the use of potassium ferricyanide, manganese peroxide and several other re-agents, but the potassium dichromate is the one usually employed.

In doses of 1-36th of a grain; increased under certain circumstances to 1-12th, strychnia is a powerful nervine tonic. In larger doses it poisons by affecting the whole of the contractile muscular tissue and producing tetanic convulsions, with well marked *opisthotonos*, and finally killing by suffocation.

*Antidotes.*—Tobacco enemata, chloroform, chloral hydrate, Indian hemp, sal. volatile, animal charcoal.

**Brucia**, $C_{23}H_{26}N_2O_4.4H_2O$, may be obtained by crystallisation from the alcoholic mother liquors left after the preparation of strychnia; it crystallises in colourless oblique four-sided prisms or laminæ. It is soluble in cold water (1 in 850), and in boiling water (1 in 150), also freely in chloroform, but almost insoluble in ether. It is freely soluble in alcohol. Its salts are bitter and have an action similar to strychnia, but less powerful. Treated with nitric acid it strikes a red colour, which when heated turns yellowish, and stannous chloride added to the solution causes it to turn violet. Brucia gives a dirty orange colour precipitate with potassium iodide.

### Extractum Nucis Vomicæ.

| | |
|---|---|
| **Nux Vomica** | **16 ounces** |
| **Rectified Spirit** | **q.s.** |

**Dose—½ to 2 grains, (16 ounces yield 1 ounce of extract.)**

### Liquor Strychniæ.

| | |
|---|---|
| **Strychnia, in crystals** | **4 grains** |
| **Dilute Hydrochloric Acid** | **6 minims** |
| **Rectified Spirit** | **2 fluid drachms** |
| **Distilled Water** | **6 fluid drachms** |

**(Contains ½ grain of Strychnia in 1 fluid drachm.)**

**Dose—5 to 10 minims.**

### Tinctura Nucis Vomicæ.

| | |
|---|---|
| **Nux Vomica** | **2 ounces** |
| **Rectified Spirit ad.** | **20 fluid ounces** |

**Soften by steam, dry and powder. Macerate 48 hours, then percolate. (2-5ths the strength of P.D.)**

**Dose—10 to 20 minims. (1 grain of Nux Vomica in 11 minims.)**

***Antidotes*—Tobacco enemata, chloroform, sal. volatile, animal charcoal.**

Strychnia being a cumulative remedy requires to be watched with care. The use of *liquor strychniæ* is much to be preferred to the exhibition of the alkaloid in the solid state.

**IGNATII SEMINA, St. Ignatius's Beans.**—The seeds of *Strychnos Ignatia*, from the Philippine Islands. Not official.

**Description.**—Dark coloured beans about 1 inch in length, ovoid in form and very irregular in shape owing to pressure, with well marked hilum at one end and slightly hairy on the surface.

**Uses.** — For the manufacture of strychnia. An extract of the seeds has likewise been introduced into medicine.

**Chemistry.**—The seeds contain 1·5 per cent. of strychnia and ·5 of brucia.

**SPIGELIÆ RADIX, Carolina or Indian Pink Root.**—The dried rhizome, with rootlets and portions of the herb attached, of *Spigelia Marilandica*, from southern parts of North America. Not official.

**Botanical Source.**—It is a herb with a perennial and quadrangular stem, and sessile, lanceolate and decussate leaves. The flowers are sessile and in spikes.

**Description.**—A short knotty dark brown rhizome with knotty roots, having portions of the quadrangular stem attached, sometimes almost the entire plant. It must be carefully distinguished from Serpentary Root to which it bears a resemblance.

**Uses.** — Anthelmintic. In large doses an acrid narcotic poison.

**Chemistry.**—It has not been properly examined, but appears to contain both a fixed and volatile oil, and a bitter extractive matter, which is possibly the active principle.

## NATURAL ORDER.—GENTIANACEÆ.

Smooth herbs with opposite, entire, sessile and ribbed leaves; flowers regular; calyx and corolla persistent; stamens equal in number to, and alternate with, the lobes of the corolla; ovary superior 1-celled, with 2 parietal placentæ meeting in the centre; fruit, usually a capsule with septicidal dehiscence; seeds, numerous and albuminous.

**GENTIANÆ RADIX, Gentian.**—The dried root of *Gentiana lutea*, collected in the mountainous districts of Central and Southern Europe.

**Botanical Source.**—The *Gentiana lutea* is a herb growing 2 to 3 feet high, with a perennial root, and having opposite sessile, ovate, and ribbed leaves; inflorescence, verticillasters of dark bluish flowers, with irregular corolla.

**Description.**—The twisted root from ½ to 1 inch in thickness, brownish externally, yellowish within. The roots are much wrinkled longitudinally, and marked transversely with many rings.

**Uses.**—A pure simple bitter tonic.

**Chemistry.**—The active principle of gentian is called *gentiopicrin*, $C_{20}H_{30}O_{12}$, of which the root contains about ·1 per cent. This substance is a neutral, crystallisable glucoside, soluble in water and spirit. By boiling with a dilute acid it is converted into *gentiogenin* and glucose. It forms a yellowish liquid with potassium iodide, which rapidly loses its bitterness. It is insoluble in ether. Gentian also contains *gentianic* acid, $C_{14}H_{10}O_5$, which is in pale yellow silky crystals, tasteless and volatile without decomposition. This constituent is inert. Besides these we find in gentian, sugar, pectin, and oil, but no starch.

### Extractum Gentianæ.

| | |
|---|---|
| Gentian Root ........................ | 16 ounces |
| Boiling Distilled Water ................ | 1 gallon |

(100 lbs. of root yield about 50 lbs. of extract.)

Dose—2 to 10 grains.

### Infusum Gentianæ Compositum.

| | |
|---|---|
| Gentian Root, sliced .................. | 1 drachm |
| Bitter Orange Peel, cut small .......... | 1 drachm |
| Fresh Lemon Peel, ,, .......... | ¼ ounce |
| Boiling Distilled Water ................ | 10 fluid ounces |

Infuse in a covered vessel 1 hour, and strain.

*Incompatibles*—Salts of iron, lead, and analogous salts.

Dose—1 to 2 ounces.

### Mistura Gentianæ.

| | |
|---|---|
| Gentian Root, sliced .................. | ¼ ounce |
| Bitter Orange Peel, cut small .......... | 30 grains |
| Coriander Fruit, bruised .............. | 30 grains |
| Proof Spirit ........................... | 2 fluid ounces |
| Distilled Water ...................... | 8 fluid ounces |

Dose—½ to 1 ounce. (Infusion, 1 in 80; mixture, 1 in 40; tincture 1 in 13⅓.)

**Tinctura Gentianæ Composita.**

| | |
|---|---|
| Gentian Root, bruised ................. | 1½ ounce |
| Bitter Orange Peel, cut small .......... | ¾ ounce |
| Cardamom Seeds, freed from the pericarps and bruised ...................... | ¼ ounce |
| Proof Spirit .........................ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

DOSE—½ to 2 drachms. (4 grains of Gentian Root in 1 fluid drachm.)

**Substitutions.**—Owing to careless collection, gentian frequently contains the root of *Gentiana purpurea*, which is somewhat thicker having a peculiar branched appearance at the top never seen in gentian. Two rarer mixtures of the roots are *Gentiana punctata* and *G. Pannonica*, the root much resembling the *purpurea* but not so thick.

**CHIRATA, Chiretta** (variously spelt).—The entire plant of *Ophelia Chirata*, collected in Northern India.

**Botanical Source.**—It is an annual herb with orange brown stem and a tapering root. The stem is cylindrical beneath, but bluntly quadrangular towards its apex, having a thin bark and very large pith. The leaves are entire, sessile, ovate-acuminate, opposite and decussate; inflorescence, a panicled cyme of numerous flowers with two bracts at each division. The corolla persistent and rotate, and the capsules 1-celled, but bi-valved with numerous seeds.

**Collection.**—The entire plant is pulled up when in flower, with some of the lower fruits beginning to ripen, and is tied into bundles weighing about 2 lbs.

**Uses.**—A pure bitter tonic, more powerful than gentian.

**Chemistry.**—Chirata contains two bitter principles: *Ophelic* acid $C_{13}H_{20}O_{10}$, and *Chiratin*, $C_{26}H_{48}O_{15}$, the former being the most abundant. *Ophelic* acid is an amorphous, yellowish, viscid substance, with a bitter taste and faint odour. It is soluble in water, alcohol, and ether. Its watery solution reduces Fehling's solution of copper, and may be precipitated by basic plumbic acid, but not by tannic acid. *Chiratin* is a neutral, crystalline, pale yellow glucoside, soluble in water, alcohol and ether, and is precipitated by tannic acid.

**Infusum Chiratæ.**

| | |
|---|---|
| Chiretta, cut small ...................... | ½ ounce |
| Distilled Water at 120° ................ | 10 fluid ounces |

Infuse in a covered vessel ½ hour, and strain.

*Incompatibles*—Most metallic salts.

DOSE—1 to 2 ounces.

**Tinctura Chiratæ.**

| | |
|---|---|
| Chiretta, cut small, bruised ............ | 2½ ounces |
| Proof Spirit.........................ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

DOSE—½ to 2 drachms. (7 grains of Chiretta in 1 fluid drachm.)

**Substitutions.**—The chiretta imported up to the present has been found perfectly pure. There are, however, two British plants belonging to the same order which may be used as substitutes, and which indeed have been employed for many years by the herbalist. They are:—

1. *Menyanthes trifoliata*, or Buckbean, sometimes called Marsh trefoil. It possesses very characteristic large ternate leaves, with long petioles.

2. *Erythræa Centaurium*, or small centaury.

Both these plants are pure bitters.

## NATURAL ORDER.—ASCLEPIADACEÆ.

### HEMIDESMI RADIX,

**Hemidesmus Root,** *Indian Sarsaparilla.*—The dried root of *Hemidesmus Indicus,* from India.

**Botanical Source.**—The *Hemidesmus Indicus* is a twining shrub growing both in India and Ceylon.

**Description.**—It is a brownish cylindrical tortuous root, longitudinally furrowed, from ·2 to ·7 of an inch in thickness, with a few thin rootlets and a number of annular cracks, having an odour resembling that of the tonquin bean.

**Uses.**—Tonic, alterative, diuretic. Employed as a substitute for sarsaparilla.

**Chemistry.**—Hemidesmus has not been satisfactorily examined.

**Syrupus Hemidesmi.**

| | |
|---|---|
| Hemidesmus Root, bruised ............ | 4 ounces |
| Refined Sugar ........................ | 28 ounces |
| Distilled Water ...................... | 20 fluid ounces |

Product, 2 lbs. 10 ounces by weight; or 2 lbs. by measure.

DOSE—1 drachm. Sp. gr. 1·335.

## NATURAL ORDER.—CONVOLVULACEÆ.

Herbs or shrubs with a twining habit, and alternate exstipulate leaves; calyx much imbricated and persistent; corolla 5-plaited and deciduous; stamens 5 alternate with the lobes of the corolla, and rising from near its base; ovary superior; fruit capsular 1—4-celled with septifragal dehiscence.

**JALAPA, Jalap.**—The dried tubercules of *Exogonium purga*, imported from Mexico.

**Botanical Source.**—Jalap is a twining plant with a tuberous root, deeply auricled cordate leaves and fine pink flowers, which grows wild on the Eastern slopes of the Andes.

**Collection.**—The root is dug up at any time. The larger tubercules are gashed to assist the drying. They are then placed in a net inside the house until quite dry.

**Description.**—Ovoid tubercules, pointed at one end, very dense and hard, dark brown and wrinkled. They are frequently met with gashed or cut into segments.

They form a light greyish brown powder, with a peculiar odour and a sickly taste.

**Uses.**—A drastic purgative, producing copious watery stools, not followed by after-irritation. As a rule, jalap does not gripe and is less irritant than either gamboge or podophyllin. It is useful for the removal of round and thread worms. Dose, of the powdered root, 10 to 30 grains; of the resin, 1 to 5 grains.

**Chemistry.**—Jalap root contains about 12 to 18 per cent. of resin, which is the active principle, together with sugar, gum and cellulose.

**Jalapæ Resina**, resin of jalap, is prepared officially as follows:—Digest 8 ounces of jalap in coarse powder with 16 fluid ounces of rectified spirit in a covered vessel, at a gentle heat for 24 hours; then transfer to a percolator, and when the tincture ceases to pass, pour into the percolator successive portions of rectified spirit, until the jalap is exhausted. Add to the tincture 4 fluid ounces of water, and distil off the spirit by the water-bath. Remove the residue while hot to an open dish and allow it to become cold. Pour off the supernatant fluid from the resin, wash it two or three times with hot water, and dry it in a porcelain plate by the heat of a stove or water bath.

As thus prepared the resin is in dark brown, opaque fragments, brittle, breaking with a resinous fracture and easily reduced to a pale brown powder. It is freely soluble in rectified spirit, but only very slightly soluble in ether, and insoluble in oil of turpentine. The portion of the official resin insoluble in ether consists of *convolvulin* $C_{31}H_{50}H_{16}$. It melts at 300° F., and is colourless, and insoluble in ammonia. It is soluble in caustic potash and soda, which converts it into convolvulic acid. When oxidised by nitric acid, it is converted into oxalic and ipomœic acids. The portion of the official resin which is soluble in ether is called jalapin ($C_{34}H_{56}O_{16}$), amounts to about 7 per cent. and appears to be active.

Jalap resin enters into the composition of Pilula Scammonii Composita.

**Extractum Jalapæ.**

| | |
|---|---|
| Jalap, in coarse powder | 16 ounces |
| Rectified Spirit | 4 pints |
| Distilled Water | 1 gallon |

(100 lbs. of Root yield 50 lbs. of extract.)

Dose—5 to 15 grains.

### Pulvis Jalapæ Compositus.

| | |
|---|---|
| Jalap, in powder ...................... | 5 ounces |
| Acid Tartrate of Potash................ | 9 ounces |
| Ginger, in powder ..................... | 1 ounce |

Dose—20 to 60 grains. (10 grains of Jalap in 30 grains.)

### Tinctura Jalapæ.

| | |
|---|---|
| Jalap, in coarse powder ................ | 2½ ounces |
| Proof Spirit.........................ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

Dose—½ to 2 drachms. (7 grains of Jalap in 1 fluid drachm.)

Jalap enters into the composition of Pulvis Scammonii Compositus.

**Adulterations.**—1. The root of *Ipomœa Orizabensis* or Mexican male jalap. Is usually found in spindle-shape pieces of a lighter colour than true jalap, and very deeply wrinkled. It is compact, but not so heavy as true jalap. When broken it exhibits a radiate section, and a number of woody fibres project from the broken surface. The resin yielded by this root is soluble in ether, and apparently identical with the jalapin of scammony resin. It is similar in re-actions and exists to the extent of about 12 per cent.

2. The root of *Ipomœa simulans*, or Tampico jalap, is very similar to true jalap, but more elongated and shrivelled, and destitute of the transverse scars found on the true tubercules. It yields 10 per cent. or more of a *purified* resin entirely soluble in ether.

**SCAMMONIÆ RADIX, Scammony Root.**—The dried root of *Convolvulus Scammonia*, imported from Syria and Asia Minor.

**Botanical Source.**—The *Convolvulus Scammonia* is a twining plant, much resembling the wild convolvulus which grows in waste places in Syria and Asia Minor.

**Description.**—Long tough roots, somewhat like a carrot in shape, and spirally twisted; sometimes attaining 3 inches in diameter at the crown. It is greyish brown without and very pale brown internally with a faint odour.

**Chemistry.**—The root yields from 5 to 5½ per cent. of scammony resin, besides gum, starch, sugar and extractive matter.

**Scammoniæ Resina** (B.P.), resin of Scammony, is prepared, according to the B.P., in a manner similar to that described for the manufacture of jalap resin. It is in dark brown fragments, translucent at the edges, breaking with a resinous fracture, and it is completely soluble in alcohol. It is also entirely soluble in ether, and does not form an emulsion when rubbed with water (a distinction from *scammonium*). It should be tested for possible adulteration with guaiacum resin by placing a drop of its tincture on a freshly cut potato peeling, which ought not to turn blue.

**Extractum Colocynthidis Compositum.** (*Vide* p. 167.)

**Mistura Scammonii.**

| | |
|---|---|
| Resin of Scammony .................. | 4 grains |
| Milk .................................. | 2 fluid ounces |

Dose—½ to 2 ounces (for a child). Virgin Scammony makes a better emulsion (*Squire.*)

**Pilula Scammonii Composita.**

| | |
|---|---|
| Resin of Scammony .................. | 1 ounce |
| Resin of Jalap ......................... | 1 ounce |
| Curd Soap, in powder ................ | 1 ounce |
| Strong Tincture of Ginger.............. | 1 fluid ounce |
| Rectified Spirit......................... | 2 fluid ounces |

Add the tincture and spirit to the soap and resins, and dissolve with the aid of a gentle heat, then evaporate in a water bath to a pilular consistence.

Dose—5 to 15 grains.

**Scammonium,** ***Scammony.***—A gum-resin obtained by incision from the living root of *Convolvulus Scammonia*, imported from Smyrna and Asia Minor.

**Collection.**—The head of the root is cut off in a slanting direction 2 or 3 inches below the crown, and the milky juice which immediately flows out is collected in a mussel-shell. Sometimes the juice is allowed to dry in the shell, but as a rule it is emptied into a receptacle, and after a sufficient quantity has been collected, the whole is well mixed together and allowed to dry. In this way the purest scammony is obtained, known as *Virgin Scammony.*

**Description.**—The finest virgin scammony is in flat pieces or lumps, of a dark grey colour. It is easily broken with a lustrous fracture, and when powdered it becomes ashy grey, with a peculiar cheese-like odour. When rubbed with water it forms a white emulsion.

**Uses.**—Scammony is similar in action to jalap.

**Chemistry.**—Scammony is a gum-resin yielding from 88 to 90 per cent. of resin to ether, and leaving a fairly colourless residue. The active portion is the resin called *jalapin*, $C_{34}H_{56}O_{16}$, which is readily soluble in ether, alcohol, and benzol, but insoluble in carbon disulphide.

**Confectio Scammonii.**

| | |
|---|---|
| Scammony, in fine powder | 3 ounces |
| Ginger, in fine powder | 1½ ounce |
| Oil of Carraway | 60 minims |
| Oil of Cloves | 30 minims |
| Syrup | 3 fluid ounces |
| Clarified Honey | 1½ ounce |

Dose—10 to 30 grains (10 grains of Scammony in 30 grains).

**Pulvis Scammonii Compositus.**

| | |
|---|---|
| Scammony, in powder | 4 ounces |
| Jalap, " | 3 ounces |
| Ginger, " | 1 ounce |

Dose—10 to 20 grains (4 grains of Scammony in 8 grains).

Scammony is an ingredient in Pilula Colocynthidis Composita and Pilula Colocynthidis et Hyoscyami.

**Adulterations.**—Owing to its cost, scammony is extensively adulterated, most frequently by starch and chalk. Generally, scammony that is heavy, clayey-looking, not easily broken, and which when fractured does not exhibit a clean lustrous surface, should be rejected; and more especially so if it does not yield at least 80 per cent. of resin to ether.

A simple method of examining scammony is by taking a weighed portion and drying it at 212° F., when the loss equals moisture. The dried residue is then to be extracted with ether, and the ether evaporated in a weighed capsule spontaneously, and when dried, the capsule and its contents are heated for a time in a water-bath and weighed, the weight giving the amount of resin. The insoluble residue from the ether may then be treated with cold water to dissolve out the natural gummy constituents, and any residue left may be boiled with water, and the cold decoction tested with iodine for starch. Lastly, any residue insoluble in boiling water may be tested for chalk by effervescing with hydrochloric acid, neutralising the solution and testing for lime with ammonium oxalate.

## NATURAL ORDER.—SOLANACEÆ.

Herbs or shrubs with alternate and often geminate leaves; inflorescence axillary or extra axillary; calyx persistent—5 partite; corolla regular with valvate æstivation; stamens equal in number to and alternate with the corolla lobes; anthers introse; ovary superior 2-celled, with axile polyspermous placentæ; fruit capsular or baccate; seeds numerous and albuminous.

It is divided into two sub-orders:—

1. *Rectembryeæ*, embryo straight and short.

2. *Curvembryeæ*, embryo slender and curved.
Ex. Solanum and Capsicum.

**DULCAMARA, Woody Nightshade.**—The dried young branches of *Solanum Dulcamara*, from indigenous plants.

**Botanical Source.**—*Solanum Dulcamara*, or Bitter Sweet, is a shrubby plant, found in hedges, with ovate, acute, entire and auriculate leaves; inflorescence extra axillary cymes; corolla rotate and purple; anthers, connivant and standing out from the centre of the flower in a bright yellow mass; fruit, baccate and bright scarlet.

**Collection.**—Branches of the first or second year should be chosen and collected in the autumn, when the leaves have fallen off.

**Description.**—Light, cylindrical, hollow stems, about the thickness of a quill, sometimes slightly warty or furrowed longitudinally.

**Uses.**—Supposed to be beneficial in rheumatism and skin diseases, but its action is very doubtful.

**Chemistry.**—The stems are said to contain ⅛th per cent. of an alkaloid called *dulcamarine*, which is amorphous. They also appear to yield a bitter principle decomposable into sugar and solanine, but the quantity of this latter substance is very minute.

### Infusum Dulcamaræ.

| | |
|---|---|
| Dulcamara, bruised.................... | 1 ounce |
| Boiling Distilled Water ................ | 10 fluid ounces |

Infuse in a covered vessel for 1 hour, and strain.

*Incompatibles*—The alkalies and their carbonates.

DOSE—1 to 2 ounces.

## CAPSICI FRUCTUS, Capsicum, *Chillies, Cayenne Pepper, Guinea Pepper.*

The dried fruit of *Capsicum fastigiatum*, imported from Zanzibar.

**Botanical Source.**—The capsicum is a small shrub, bearing oblong deep red capsules containing seeds of a pale colour.

**Description.**—Small membranous pods, orange-red in colour, with a very burning taste, conically pointed, smooth, shining, and somewhat shrivelled. From ¼ to ¾ inch long.

**Uses.**—Capsicum is a stimulant to the nerves of sensation, frequently administered in atonic dyspepsia, and to restore the function of the stomach after overdoses of opium. The Tincture of Capsicum added to Infusion of Roses in the proportion of ½ drachm to 8 ounces, forms an excellent gargle for sore throat.

**Chemistry.**—The active principle is *capsicin*. It is obtained by making a tincture, evaporating to dryness, and extracting the residue with ether. It is a crystalline alkaloid, volatile by heat, producing extremely acrid and irritating fumes. When distilled with potash, it yields a substance very similar in smell to conia. It may be precipitated by tannic acid, and is very soluble in petroleum ether. From the pericarp of the fruit a pungent active principle, called *capsaicin*, has been isolated.

**Tinctura Capsici.**

| | |
|---|---|
| Capsicum Fruit, bruised .............. | ¾ ounce |
| Rectified Spirit ....................ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

Dose—10 to 20 minims. As a gargle ½ drachm to 8 minims.
(1 grain of Capsicum in 60 minims.)

**Substitutions.**—The fruits of *Capsicum annuum* the ordinary Chillies of commerce. They are easily distinguished from the official capsicum by being three or more inches in length, and much broader.

## NATURAL ORDER.—ATROPACEÆ.

Similar in characters to the Solanaceæ, but distinguished by the æstivation of the corolla being imbricate and in having one or more of the stamens sterile, with either extrorse or introrse anthers.

**BELLADONNÆ RADIX, Belladonna Root.**—The dried root of *Atropa Belladonna*, cultivated in England, but chiefly imported from Germany.

**Botanical Source.**—The *Atropa Belladonna* is a perennial herb, with ovate, acute, entire leaves, having an unequal base. The flowers are axillary, the calyx persistent, and the corolla campanulate, purple above, but greenish at the base. The fruit is baccate, bluish black in colour, and about the size of a small cherry.

**Description.**—In rough irregular pieces, of a dirty greyish colour, branched and wrinkled, and whitish internally. The roots are sometimes 2 inches thick, but those not thicker than the finger should be preferred as they yield nearly ½ per cent. of atropia. The older roots are not by far so rich in that alkaloid.

**Uses.**—A powerful vasculo-cardiac stimulant, useful in syncope. It is also beneficial in neuralgia, rheumatism and acute inflammation generally. It is a powerful cerebro-spinal poison. Belladonna has been long used in ophthalmic practice to dilate the pupil of the eye: acting in a directly opposite manner to Calabar bean which contracts the pupil. It is also employed to check the secretion of milk.

*Antidotes.* — Emetics and afterwards astringents. Opium may be used, carefully avoiding narcotism.

### Linimentum Belladonnæ.

| | |
|---|---|
| Belladonna Root, in coarse powder...... | 20 ounces |
| Camphor ............................ | 1 ounce |
| Rectified Spirit ....................ad. | 20 fluid ounces |

(1 fluid ounce is equal to 1 ounce of Root.)

Moisten the Root with spirit for 3 days, then percolate. (7 parts and 1 of chloroform form an excellent liniment for lumbago, applied on spongio-piline).—*Squire*.

Atropia, $C_{17}H_{23}NO_3$, is prepared by macerating 2 lbs. of belladonna root, recently dried and in coarse powder, in 4 pints of rectified spirit for 24 hours, with frequent stirring. Transfer to a displacement apparatus and exhaust with 6 pints more of spirit by slow percolation. Add 1 ounce of slaked lime to the tincture placed in a bottle, and shake occasionally several times. Filter; add diluted sulphuric acid in very feeble excess, and filter again. Distil off 3-4ths of the spirit; add to the residue 10 fluid ounces of distilled water; evaporate at a gentle heat, but as rapidly as possible, until the liquid is reduced to 1-3rd of its volume and no longer smells of alcohol; then let it cool. Add very cautiously, with constant stirring, a solution of potassium carbonate, so as nearly to neutralise the acid, care, however, being taken that an excess be not used. Set to rest for 6 hours; then filter and add potassium carbonate, in such quantity that the liquid shall acquire, on testing, alkaline re-action. Place it in a bottle with 3 fluid ounces of chloroform; mix well by a frequently repeated brisk agitation, and pour the mixed liquids into a funnel furnished with a glass stop-cock. When the chloroform has subsided, draw it off and distil it in the water-bath from the retort, connected with the condenser. Dissolve the residue in warm rectified spirit; digest the solution with a little animal charcoal; filter, evaporate and cool, until colourless crystals are obtained.

In this process the natural bimalate of atropia is extracted by the alcohol, and is then decomposed by the lime, forming calcium malate, and setting free atropia, which is immediately converted into sulphate, as if left in contact with heated water the alkaloid decomposes. The first addition of potassium carbonate separates the excess of sulphuric acid and resinous matters; while the second addition (this time in excess) sets free the alkaloid, which is then dissolved out by the chloroform. As thus prepared atropia is in colourless acicular prisms, very slightly soluble in water, but soluble in alcohol, ether and chloroform. Its watery solution is alkaline; gives a precipitate with auric chloride, and powerfully dilates the pupil of the eye. When left with caustic alkalies, atropia is decomposed into tropic acid, $C_9H_{10}O_3$, and tropinia, $C_8H_{15}NO$.

**Liquor Atropiæ.**

| | |
|---|---|
| Atropia, in crystals | 4 grains |
| Rectified Spirit | 1 fluid drachm |
| Distilled Water | 7 fluid drachms |

(½ grain of Atropia in 1 fluid drachm.)

**Unguentum Atropiæ.**

| | |
|---|---|
| Atropia | 8 grains |
| Rectified Spirit | 30 minims |
| Prepared Lard | 1 ounce |

¼ drachm containing ¼ grain of Atropia is sufficient for one application.

**Atropiæ Sulphas**, sulphate of atropia, prepared by mixing 120 grains of atropia with 4 fluid drachms of water, and gradually adding diluted sulphuric acid, until a perfectly neutral solution is obtained, and evaporating to dryness at a temperature not exceeding 100° F. It is a colourless powder, freely soluble in water.

**Liquor Atropiæ Sulphatis.**

| | |
|---|---|
| Sulphate of Atropia | 4 grains |
| Distilled Water | 1 fluid ounce |

(½ grain of Sulphate of Atropia in 1 fluid drachm.)

## BELLADONNÆ FOLIA.—The leaves of *Atropa Belladonna.*

**Collection.**—They should be gathered when the plant is in flower.

**Chemistry.**—Belladonna leaves contain atropia.

### Extractum Belladonnæ.

The expressed juice of the fresh leaves and young branches of Belladonna evaporated to an extract.

(100 lbs. of herb yield 16 lbs. dried, or 56 lbs. of juice, or 63 ounces of extract.)

Dose—¼ to 1 grain.

### Emplastrum Belladonnæ.

| | |
|---|---|
| Extract of Belladonna | 3 ounces |
| Resin Plaster | 3 ounces |
| Rectified Spirit | 6 fluid ounces |

Rub the extract and spirit in a mortar, and when the insoluble matter has subsided, decant the clear solution. Remove the spirit by distillation, and mix the extract obtained with the resin plaster, by heating in a water-bath to a proper consistence.

### Succus Belladonnæ.

| | |
|---|---|
| Belladonna, fresh leaves, and young branches | 7 lbs. |
| Rectified Spirit | q.s. |

Bruise the Belladonna in a stone mortar, press out the juice, and to every 3 measures of juice, add one of spirit. Set aside 7 days, and filter. Keep it in a cool place.

Dose—5 to 15 minims.

**Tinctura Belladonnæ.**

| | |
|---|---|
| Belladonna Leaves, in coarse powder.... | 1 ounce |
| Proof Spirit........................ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

DOSE—5 to 20 minims. (1 grain of Belladonna in 22 minims —half the strength of London and Dublin.)

*Antidotes*—An emetic of 10 grains of sulphate of copper, afterwards opiates.

**Unguentum Belladonnæ.**

| | |
|---|---|
| Extract of Belladonna ................ | 80 grains |
| Prepared Lard ........................ | 1 ounce |

Rub down the Extract with a few drops of water before mixing with the lard.

**STRAMONII FOLIA, Stramonium Leaves.**—The dried leaves of *Datura Stramonium*, (thorn apple), cultivated in Britain.

**Botanical Source.**—The Datura is an annual herb with a smooth dichotomous stem. The leaves, which arise from the forks of the stem, are ovate, acuminate, deeply dentate, and markedly petiolate. The flowers are axillary, and have a white infundibuliform corolla, about 3 inches long. The fruit is a capsule, covered externally with prickles and dehiscing septifragally, containing numerous dark coloured seeds.

**Uses.**—For making cigarettes for the relief of spasmodic asthma.

**Chemistry.**—The leaves contain, in addition to fixed oil, resin, wax, and about ·03 per cent. of daturia—an alkaloid resembling atropia.

## STRAMONII SEMINA, Stramonium Seeds.

—The ripe seeds of the *Datura Stramonium.*

**Description.**—Dark brownish grey, reniform seeds, flat and very reticulated in the testa.

**Uses.**—Similar to belladonna.

**Chemistry.**—They yield about ·1 per cent. of *daturia*, $C_{17}H_{23}NO_3$, isomeric with, and possessing the same properties as atropia. They also contain 25 per cent. of fixed oil.

### Extractum Stramonii.

| | |
|---|---|
| Stramonium Seeds, in coarse powder .... | 16 ounces |
| Ether .................................. | q.s. |
| Proof Spirit .......................... | q.s. |
| Distilled Water ...................... | q.s. |

100 lbs. of the Seeds yield from 12 lbs. to 14 lbs. of Extract.

Dose—¼ to ½ grain.

**Tinctura Stramonii.**

| | | |
|---|---|---|
| Stramonium Seeds, bruised ............ | | 2½ ounces |
| Proof Spirit ......................... | ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

Dose—10 to 30 minims (1 grain of Stramonium Seeds in 9 minims).

*Antidotes*—An emetic of 10 grains of sulphate of copper, afterwards opiates.

**Datura Tatula.**

The leaves have been strongly recommended to be used as cigarettes, which have been found useful in asthma.

## HYOSCYAMI FOLIA, Henbane.—

The fresh and dried leaves of *Hyoscyamus niger*, from indigenous plants.

**Botanical Source.**—The henbane is a biennial or annual herb, of a pale, dull green colour, and feeling clammy to the touch. Both stem and leaves are pilose. The leaves are simple, sessile and ovate; with an acute apex and a sinuate dented margin. The flowers are axillary, and the corolla is infundibuliform; of a dirty straw colour, with violet veins. The fruit is a capsule, dehiscing transversely by a convex lid, from which circumstance it is called a pyxis or pyxidium.

**Collection.**—The biennial henbane is the more valuable, and is cultivated extensively at Hitchin. The first year's leaves gathered in August are usually dried; while the second year's leaves gathered in July are employed fresh for making the extract.

**Uses.**—The action of henbane is similar to belladonna, producing dilation of the pupil and a tendency to sleep. It is employed generally as a sedative, and to correct the griping effect of purgatives. In excessive doses it is a poison.

**Chemistry.**—The active principle of henbane is an alkaloid called *hyoscyamia*, $C_{15}H_{23}NO_3$. It is an oily liquid, which is soluble in water, ether, alcohol and chloroform, and smells and tastes somewhat of tobacco. It is decomposed by boiling with caustic alkalies, being resolved into hyoscinic acid, $C_9H_{10}O_3$, and hyoscina, $C_6H_{13}N$, the latter being a volatile alkaloid. The sulphate of hyoscyamia, which is a suitable and permanent form for the administration of this alkaloid, may be prepared by macerating henbane seeds in water, acidulated with sulphuric acid and then percolating to exhaustion. The fluid thus obtained is placed in flat dishes and allowed to evaporate spontaneously, when it deposits a large group of crystals of potassium sulphate. The mother liquor is neutralised with barium carbonate, and then evaporated to dryness, and treated with ether, containing 10 per cent. of alcohol, which dissolves the alkaloid. The etherial solution is then evaporated to dryness and the residue taken up with water acidulated with sulphuric acid, filtered to remove any resinous matter undissolved. Lastly, a solution of hyoscyamia thus obtained is evaporated to dryness over sulphuric acid in a dessicator.

### Extractum Hyoscyami.

The expressed juice of the fresh leaves and young branches of Hyoscyamus, evaporated to an extract.

(100 lbs. yield 50 lbs. of juice, 5 lbs. of extract, or 15½ lbs. of dried leaves.)

Dose—5 to 10 grains.

### Succus Hyoscyami.

| | |
|---|---|
| Hyoscyamus, fresh leaves and young branches ........................ | 7 lbs. |
| Rectified Spirit ...................... | q.s. |

Bruise the Hyoscyamus in a mortar, press out the juice, and to every 3 measures of juice, add one of spirit. Set aside 7 days, and filter. Keep in a cool place.

Dose—½ to 1 drachm.

**Tinctura Hyoscyami.**

| | |
|---|---|
| Hyoscyamus Leaves, in coarse powder .. | 2½ ounces |
| Proof Spirit........................ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

Dose—½ to 1 drachm (7 grains of Hyoscyamus Leaves in 1 fluid drachm.)

**TABACI FOLIA, Tobacco.**—The dried leaves of *Nicotiana Tabacum*, cultivated in America.

**Botanical Source.**—Tobacco is a herb with simple, sessile, oblong, lanceolate, and entire leaves, the lower ones being very large, often attaining the length of 2 feet. Inflorescence terminal and in panicles; corolla, tubular infundibuliform in shape, and a pale pink colour.

**Uses.**—As an injection for the relief of spasmodic cholic; but its employment is dangerous, as it is really a powerful poison, causing intense vomiting and purging, with cold sweats and entire muscular relaxation. The best antidotes are external warmth and diffusible stimulants.

**Chemistry.**—When tobacco is distilled with potassium hydrate it yields from 6 to 7 per cent. of a volatile alkaloid called *nicotia*, $C_{10}H_{14}N_2$. It is an inflammable oily liquid, boils at 480° F., and has an odour of tobacco. It is soluble in water and fixed oils, also in alcohol and ether. Its aqueous solution is strongly alkaline, and its salts are very deliquescent. It gives a precipitate with platinic chloride, tannic acid, mercuric chloride, and plumbic acetate. To obtain perfectly pure nicotia, a strong aqueous solution of tobacco (in which the alkaloid exists combined with citric and malic acids) is mixed with an excess of potassium hydrate, and shaken up with ether until nothing more can be extracted. Oxalic acid is then added to the etherial solution, which causes the separation of oxalate of nicotia as a syrupy substratum. This is washed with ether until perfectly clean, and the pure oxalate thus obtained is then treated with excess of potash and shaken up with ether, and finally the alkaloid taken up with the ether is distilled in a current of hydrogen.

### Enema Tabaci.

| | |
|---|---|
| Leaf Tobacco ........................ | 20 grains |
| Boiling Water ........................ | 8 fluid ounces |

Infuse half an hour and strain.

## NATURAL ORDER.—OLEACEÆ.

Trees or shrubs with opposite leaves; flowers regular and quaternary in calyx and corolla; stamens 2 (rarely 4) epipetalous; ovary superior 2-celled, with 2 suspended ovules in each cell; fruit frequently drupaceous; seeds albuminous.

**MANNA.**—The concrete saccharine exudation of *Fraxinus Ornus* and *Fraxinus rotundifolia*, imported from Sicily.

**Botanical Source.**—The Manna ash is a small tree, apparently indigenous to Italy, having compound imparipinnate leaves, and bearing panicles of feathery flowers in early summer.

**Collection.**—Manna is obtained by making incisions into the bark, and placing leaves and sticks below them in the middle of summer. The clear juice flows out, concretes upon the leaves and sticks and produces what is known as flake manna, which is the article the most valued in this country, although the manna in tears is usually purer.

**Description.**—In even, friable, and porous stalactiform pieces, of a yellowish white colour, curved on one side, with a faint odour and a sweet taste. The pieces are usually from 1 to 6 inches long, and from 1 to 2 inches wide.

**Uses.**—A mild laxative for children. Dose, 1 drachm and upwards. B.P. dose up to ℥j.

**Chemistry.**—Manna contains from 60 to 80 per cent. of mannite and about 15 per cent. of dextrin and glucose. **Mannite**, $C_6H_{14}O_6$, crystallises in shining rhombic prisms, soluble in six parts of water, sparingly soluble in alcohol and insoluble in ether. Its solution is not affected by boiling with dilute acids or alkalies, and it does not reduce Fehling's solution of copper. It may be prepared artificially by treating glucose with sodium amalgam. When heated it melts at 330° F. Mannite is not a true sugar but a hexatomic alcohol, its rational formula being $C_6H_8 6HO$. Mannite may be extracted from manna by treatment with boiling rectified spirit. Manna also contains a bitterish, astringent substance called **fraxin**, $C_{16}H_{18}O_{10}$, soluble in water and alcohol.

**Substitutions.**—Inferior mannas are converted by means of glucose into what is apparently fine flake manna. This adulteration may be detected by boiling with four parts of rectified spirit, when good manna will leave a hard, and the artificial manna a viscid residue.

## OLIVÆ OLEUM, Olive Oil, *Salad Oil.*—

The oil expressed in Europe from the fruit of *Olea Europæa*, from Italy, Sicily, Spain, and North America; a native of Asia.

**Botanical Source.**—The *Olea Europæa* is a fragrant tree cultivated in countries bordering on the Mediterranean. It bears a purple oval drupe about 1 inch in length, which, when preserved for table, becomes of a greenish brown colour.

**Collection.**—The oil exudes from the mesocarp of the fruit, which contains nearly 70 per cent. The fruits are crushed, put into boxes and submitted to pressure, and the oil thus extracted is called "virgin oil." The contents of the boxes are then mixed with boiling water and once more pressed, when the second quality of oil is produced. Lastly, if the residue be left in heaps until it becomes decomposed, the last and worst variety of oil is obtained.

**Description.**—Olive oil is very pale yellow in colour, with a faint odour and bland taste. Its sp. gr. is ·916 at 63·5° F., and ·910 at 77°. At 36° it begins to become turbid, and at 20° it separates into a solid and liquid portion. It is a non-drying oil, comparatively insoluble in alcohol, but miscible with twice its bulk of ether. The finest varieties of olive oil are the Florence and Provence; the Lucca and Genoa varieties are very good, while the Gallipoli, imported in casks, is inferior.

**Uses.**—Olive oil is a nutritive emollient, and an excellent antidote in cases of irritant poison.

**Chemistry.**—It contains about 72 per cent. of olein, and 28 per cent. of palmitin and stearin. It is readily saponifiable by alkalies and plumbic oxide.

**Preparations.**—Hard soap, soft soap, curd soap, soap liniment, soap plaster, lead plaster, &c.—(Refer to B.P.) Olive oil is also contained in the following preparations:—Cataplasma Lini, Charta Epispastica, Emplastrum Ammoniaci cum Hydrargyro, Emplastrum Cerati Saponis, Emplastrum Hydrargyri, Emplastrum Picis, Enema Magnesiæ Sulphatis, Linimentum Camphoræ, Unguentum Cantharidis, Unguentum Hydrargyri Compositum, Unguentum Hydrargyri Nitratis, and Unguentum Veratriæ.

**Adulterations.**—The mixture of olive oil with cheaper oils may be detected by the following tests:—

1. Olive oil is completely solidified at 32° F.

2. Mixed with 1-12th of its volume of acid solution of nitrate of mercury it becomes in four hours perfectly solid; any foreign oil present will float upon the surface.

3. When mixed with strong sulphuric acid and the mixture is stirred with a thermometer, the raising of the temperature effected is less in the case of pure olive oil than when adulterated.

The plan adopted is to take the temperature of 50 c.c. of the oil placed in a long tube; then add 10 c.c. of strong sulphuric acid, stir the whole up with a Centigrade thermometer, and note the rise in temperature which takes place. Thus treated—

| | | | | |
|---|---|---|---|---|
| Pure olive oil | gives | a rise of | 42 | degrees |
| Colza oil | ,, | ,, | 58 | ,, |
| Sesame oil | ,, | ,, | 68 | ,, |
| Hempseed oil | ,, | ,, | 98 | ,, |
| Linseed oil | ,, | ,, | 130 | ,, |

**Soaps** are compounds produced by boiling olive or other oils or fats with alkalies or oxides and water. The olive oil may be looked upon as *glyceryl oleate*, $(C_3H_5)3C_{18}H_{33}O_2$, and when saponified it is converted into an oleate of the metal used and free glycerin (glyceryl hydrate $C_3H_53HO$). For example, in making Emplastrum Plumbi we have the following re-action

$$2C_3H_53C_{18}H_{33}O_2 + 3PbO + 3H_2O =$$
$$3Pb2C_{18}H_{33}O_2 + 2C_3H_53HO.$$

In the soaps of the B.P. the glycerin has been separated by adding salt to increase the density of the liquid, and so causing the soap to float, leaving the glycerin in the solution. In Emplastrum Plumbi the glycerin is driven off by the steam-bath heat employed (230° F.), but in the various liniments both the soap and the glycerin are retained.

The following are the official soaps and preparations in which saponification takes place during manufacture:

A. Soaps ready formed, or made with soap, and containing no glycerin, unless purposely ordered, as in Linimentum Potassii Iodidi c. Sapone.

**Sapo Durus.** (*Hard Soap.*)

*Composition*—Chiefly sodium oleate; entirely soluble in rectified spirit.

*Uses*—Diuretic in large doses, purgative combined with rhubarb for habitual constipation.

DOSE—5 to 20 grains. In mineral acid poisoning, ½ pint of the strong solution.

**Sapo Mollis.** (*Soft Soap.*)

*Composition*—Chiefly potassium oleate; entirely soluble in rectified spirit, and not imparting an oily stain to paper.

*Preparation*—The oil is boiled with a solution of potassium hydrate, until the whole has become saponified; it is then separated from the glycerin and water by means of evaporation, or by a strong solution of sodium chloride, which causes the soap to float to the surface by increasing the density of the solution.

**Emplastrum Saponis.**

| | |
|---|---|
| Hard Soap | 6 ounces |
| Lead Plaster | 36 ounces |
| Resin, in powder | 1 ounce |

### Linimentum Saponis.

| | *British.* | *London.* |
|---|---|---|
| Hard Soap .............. | 2½ ounces | 2½ ounces |
| Camphor ................ | 1½ ounce | 1½ ounce |
| Oil of Rosemary .......... | 3 fluid drachms | 13½ minims |
| Rectified Spirit............ | 18 fluid ounces | 18 fluid ounces |
| Distilled Water............ | 2 fluid ounces | 2 fluid ounces |

Digest at a temperature not exceeding 70°, for 7 days, and filter.

### Linimentum Potassii Iodidi c. Sapone.

| | |
|---|---|
| Hard Soap, cut small.................. | |
| Iodide of Potassium ............of each | 1½ ounce |
| Glycerin ............................ | 1 fluid ounce |
| Oil of Lemon ........................ | 1 fluid drachm |
| Distilled Water ...................... | 10 fluid ounces |

### Pilula Saponis Composita.

| | |
|---|---|
| Hard Soap .......................... | 2 ounces |
| Opium .............................. | ½ ounce |
| Water .............................. | q.s. |

Dose—3 to 5 grains (4 of soap in 5).

B. Preparations in which soaps are formed during preparation, and containing all the natural glycerin from the oil used, except Emplastrum Plumbi.

### Emplastrum Plumbi.

| | |
|---|---|
| Oxide of Lead ........................ | 64 ounces |
| Olive Oil ............................ | 1 gallon |
| Water .............................. | 3½ pints |

Boiled down at 230° F. to a suitable consistence with frequent stirring; consists of plumbic oleate, the glycerin being evaporated off by the temperature employed.

### Linimentum Ammoniæ.

| | |
|---|---|
| Solution of Ammonia | 1 fluid ounce |
| Olive Oil | 3 fluid ounces |

Contains ammonium oleate and glycerin.

### Linimentum Calcis.

| | |
|---|---|
| Solution of Lime | 2 fluid ounces |
| Olive Oil | 2 fluid ounces |

Contains calcium oleate and glycerin.

### Linimentum Hydrargyri.

| | |
|---|---|
| Ointment of Mercury | 1 ounce |
| Solution of Ammonia | 1 fluid ounce |
| Liniment of Camphor | 1 fluid ounce |

(1 of ointment of mercury in 3.)

Contains ammonium oleate and glycerin.

## NATURAL ORDER.—BORAGINACEÆ.

Similar to the Solanaceæ, but distinguished by their scorpioid or helicoid inflorescence and deeply 4-lobed ovary, with a solitary ovule in each lobe.

No plants of this order are now official.

ALKANET ROOT.—The dried root of *Anchusa tinctoria*, imported from Southern Europe and Asia Minor.

Alkanet root is easily recognisable from its deep red colour and characteristic marking, and is used as a dye and in colouring oil for perfumery.

**SYMPHYTUM OFFICINALE,** *Comfrey*.—An indigenous herb with ovate-lanceolate, entire, decurrent, and pilose leaves; inflorescence a scorpioid cyme (of which it is a typical illustration), and regular flowers of a pale pink colour.

It is reputed as a vulnerary by herbalists.

## NATURAL ORDER.—LABIATÆ.

Usually herbs with rectangular stems, and opposite, simple, and exstipulate leaves; flowers, irregular; calyx, persistent; corolla, labiate; stamens, 4 didynamous and epipetalous; ovary, deeply 4-lobed, with a bifid stigma and basilar style; fruit, 1—4 achænia, enclosed in persistent calyx.

**LAVANDULÆ OLEUM.**—The oil distilled in Britain from the flowers of *Lavandula vera*.

**Botanical Source.**—It is a hoary branched shrub, about 4 feet high, with small linear oblong leaves and a rectangular stem. Inflorescence, a spike of verticillasters; the corolla labiate, and purple coloured, with a powerful and agreeable odour.

**Collection.**—The entire flowering tops are cut off and distilled with water, when the oil comes over, floating on the surface of the distillate. As a rule, the flowering tops yield 1¼ per cent. of essential oil. In a good season, at Mitcham, as much as 2 lbs. of oil have been obtained from 100 lbs. of flowering tops.

**Description.**—The oil of *Lavandula* is pale yellow, when first drawn over nearly colourless, with a sp. gr. of ·87 to ·94. It boils at 397° F. It is a mixture of eleopten and stearopten, the former having the formula $C_{10}H_{16}$, and therefore isomeric with turpentine, while the stearopten is identical with camphor. Oil of lavender is very soluble in rectified spirit, and less so in proof spirit. The oil is mellowed and remarkably improved in character by keeping in a cool place and apart from the light: but by exposure to the air it absorbs oxygen and becomes acid.

### Spiritus Lavandulæ.

| | |
|---|---|
| Oil of Lavender | 1 fluid ounce |
| Rectified Spirit | 49 fluid ounces |

(9½ minims of Ol. Lavand. in 1 fluid ounce.)

Dose—½ drachm to 1 drachm (1-5th the strength of 1864).

### Tinctura Lavandulæ Composita.

| | |
|---|---|
| Oil of Lavender | 1½ fluid drachm |
| Oil of Rosemary | 10 minims |
| Cinnamon Bark, bruised | 150 grains |
| Nutmeg, bruised | 150 grains |
| Red Sandalwood | 300 grains |
| Rectified Spirit ad. | 40 fluid ounces |

Macerate 7 days, then add the oils to the strained tincture.

Dose—½ to 2 drachms.

This tincture is used to colour the official arsenical solution.

Oleum Lavandulæ is also a constituent of Linimentum Camphoræ Compositum.

**Adulteration.**—The oil distilled from *Lavandula spica*, commonly called "oil of spike." It is a French oil of inferior flavour and value, readily recognised by its inferiority in odour.

**MENTHÆ PIPERITÆ OLEUM, Oil of Peppermint.**—The oil distilled in Britain from the fresh flowering tops of *Mentha piperita*.

**Botanical Source.**—It is a perennial herb, with a procumbent and ascending stem. The leaves are ovate, lanceolate, acute and decussate; inflorescence, a short spike of verticillasters (or clustered axillary cymes).

**Collection.**—Usually cut in August, and allowed to dry on the ground before being submitted to distillation with water.

**Description.**—Very pale yellow, with clean aromatic smell, sp. gr. from ·84 to ·92.

**Uses.** — Stimulant and carminative. Useful in flatulence.

**Chemistry.** — Contains a liquid portion called *menthene*, $C_{10}H_{18}$, and a stearopten (*menthol*, $C_{10}H_{18}H_2O$), which is the odoriferous portion, and constitutes, when crystallised, the whole Chinese oil of peppermint. One ton of the plant yields about 5 lbs. of oil.

**Aqua Menthæ Piperitæ.**

| | |
|---|---|
| Oil of Peppermint | 1½ fluid drachm |
| Water | 1½ gallon |

Distil 1 gallon. (About ½ gtt. of Oil in 1 fluid ounce.)

**Essentia Menthæ Piperitæ.**

| | |
|---|---|
| English Oil of Peppermint | 1 fluid ounce |
| Rectified Spirit | 4 fluid ounces |

Dose—10 to 20 minims. (1 of Oil in 5.)

**Spiritus Menthæ Piperitæ.**

| | |
|---|---|
| Oil of Peppermint | 1 fluid ounce |
| Rectified Spirit | 49 fluid ounces |

(9½ minims of Ol. Menth. Pip. in 1 fluid ounce.

Dose—½ drachm to 1 drachm. (1-5th the strength of 1864.)

Also used in Pilula Rhei Composita.

MENTHÆ VIRIDIS OLEUM, Oil of Spearmint.—The oil distilled in Britain from the fresh flowering plant of *Mentha viridis.*

**Botanical Source.**—Spearmint is an annual herb, with a smooth, erect stem; and lanceolate, acute and equally serrated, sessile, opposite, decussate leaves; inflorescence, a spike of verticillasters.

**Collection.**—The herb is cut and distilled with water when in full flower, usually in the month of August.

**Description.**—Colourless or pale yellow. Sp. gr. ·914; boiling point 320° F.

**Uses.**—Stimulant carminative, and as a flavour in aperient draughts.

**Chemistry.**—It consists of a fluid portion or elœopten, isomeric with turpentine. When cooled to 25° F. it deposits a stearopten, called *menthol*, $C_{10}H_{18}H_2O$.

**Aqua Menthæ Viridis.**

| | |
|---|---|
| Oil of Spearmint ...................... | 1½ fluid drachm |
| Water ............................... | 1½ gallon |

Distil 1 gallon. (About ½ gtt. of Oil in 1 fluid ounce.)

## MENTHÆ PULEGII OLEUM.—

**Oil of Pennyroyal.**—The oil distilled from the fresh flowering herb of *Mentha Pulegium* cultivated in Britain. Not official.

**Botanical Source.**—Perennial herb, with branched and prostrate stem; leaves not exceeding ½ an inch in length, ovate, crenate, petiolate, opposite, decussate and slightly pilose; inflorescence, axillary verticillasters; corolla, labiate and pale purple.

**Collection.**—The herb is collected when commencing to flower.

**Description.**—Very pale yellow. Sp. gr. ·92; boiling point 395° F.

**Uses.**—Pennyroyal is stimulant and carminative.

**Chemistry.** — The odoriferous principle consists chiefly of a body isomeric with camphor, $C_{10}H_{16}O$.

**ROSMARINI OLEUM, Oil of Rosemary.**—The essential oil distilled from the flowering tops of *Rosmarinus officinalis*, cultivated in England.

**Botanical Source.** — Rosemary is a leafy shrub with simple, sessile, linear leaves, thick, revolute and hoary beneath. The flowers are greyish blue, labiate and axillary.

**Collection.**—The tops of rosemary should be cut when the flower commences to expand, and distilled with water.

**Description.**—A colourless oil, having a variable sp. gr. about ·88; boiling at 365° F., and consisting chiefly of hydrocarbon, isomeric with turpentine. One cwt. of rosemary tops yields, as a rule, 4½ ounces of oil.

**Uses.**—Stimulant and carminative. Used in perfumery and hair washes.

**Spiritus Rosmarini.**

| | |
|---|---|
| Oil of Rosemary | 1 fluid ounce |
| Rectified Spirit | 49 fluid ounces |

(1-5th the strength of 1864.)

Also contained in Linimentum Saponis Compositum and Tinctura Lavandulæ Composita.

Among other plants of the *Labiatæ* which are used in the culinary and medicinal arts, may be mentioned:—

*Marrubium vulgare*, horehound.

*Melissa officinalis*, common balm.

*Origanum vulgare*, common marjoram.

*Salvia officinalis*, garden sage.

*Thymus vulgaris*, or garden thyme.

All of these should be studied from the plants themselves both in the fresh and dry state.

Thymol, which is yielded by several plants of this order, is said to have powerful antiseptic properties. Its sp. gr. is 1·028, and it is represented by the formula $C_{10}H_{14}O$. Thymol is permanently soluble in 1000 parts of water; also in rectified spirit, fats and oils.

Used in the form of spray, and as an ointment (1 in 8).

## NATURAL ORDER.—SCROPHULARIACEÆ.

Herbs with usually opposite leaves and irregular anisomerous flowers; calyx, persistent 4—5 partite; corolla irregular, usually personate, calceolate or rotate; stamens, 2 or 4, always the reverse of the number of the corolla lobes, and if 4 didynamous; ovary, 2-celled with axile polyspermous placentæ; fruit, capsular or rarely baccate; seeds, albuminous.

**DIGITALIS FOLIA, Foxglove.**—The dried leaves of *Digitalis purpurea* from wild indigenous plants.

**Botanical Source.**—The *Digitalis* is a biennial herb, with a slightly pubescent stem and large, simple, ovate leaves having an acute apex, crenate margin and sheathing petiole. They are nearly smooth on the upper surface and downy beneath, the under surface being marked with prominent and reticulated veins. The inflorescence is a raceme of pale purple flowers. The calyx is persistent; the corolla is campanulate-labiate; the stamens are didynamous, and the fruit is a capsule with septicidal dehiscence.

**Collection.**—The leaves ought to be collected while the plant is in full flower; *i.e.*, when 2-3rds of the flowers are expanded.

**Description.**—The dried leaves exhibit the characteristics of those of the fresh plant described above.

**Uses.**—Digitalis is a sedative, given in cardiac and arterial diseases. In large doses it is an active poison, producing nausea, dizziness, dilated pupils and syncope, accompanied usually by great pain in the abdomen and purging.

**Chemistry.**—The active principle of digitalis is a neutral substance called *digitalin* (Digitalinum B.P.), which is extracted by an official process as follows:—Digest 40 ounces of digitalis leaf in coarse powder with 1 gallon of rectified spirit for 24 hours, at a temperature of 120° F.; then put them into a percolator, and when the tincture has ceased to drop exhaust the leaf by the slow percolation of another gallon of rectified spirit. Distil off the greater part of the spirit, and evaporate the remainder over a water-bath, until the whole of the alcohol has been dissipated. Mix the residual extract with 5 ounces of distilled water (to which ½ ounce of acetic acid has been previously added), and digest the solution thus formed with ½ ounce of purified animal charcoal; then filter and dilute the filtrate with water until it measures 1 pint. Add solution of ammonia nearly to neutralisation, and afterwards 160 grains of tannic acid dissolved in 3 ounces of water. Wash the precipitate formed with a little water, mix it with a small quantity of rectified spirit and ½ ounce of oxide of lead, and rub them together in a mortar. Place the mixture in a flask, and add to it 4 fluid ounces of rectified spirit; raise the temperature to 160° F., and keep it at this heat for about an hour; then add ½ ounce of purified animal charcoal; filter; from the filtrate carefully drive off the spirit by the heat of a water-bath; and, lastly, wash the residue repeatedly with pure ether.

In this process the *digitalin* is dissolved out from the alcoholic extract by diluted acetic acid, and the solution partially decolorised and nearly neutralised. It is precipitated by tannic acid, which forms a tannate of digitalinum. On rubbing this with plumbic oxide and alcohol, plumbic tannate is formed, and the digitalinum set free, which dissolves in the alcohol.

Digitalinum is met with in porous scales, inodorous and intensely bitter; soluble in spirit, but almost insoluble in ether and water; soluble in acids, but does not neutralise them. With hydrochloric acid it becomes first faint yellow, and afterwards green. It is precipitated by tannic acid. The dose is 1-60th to 1-30th of a grain made into pills, digitalinum being previously dissolved in spirit to assure thorough admixture.

### Infusum Digitalis.

| | |
|---|---|
| Digitalis Leaves, dried ................ | 30 grains |
| Boiling Distilled Water ................ | 10 fluid ounces |

Infuse in a covered vessel for 1 hour, and strain.

*Incompatibles*—Most metallic salts, and preparations of cinchona.

Dose—¼ to ½ ounce.

### Succus Digitalis. (Prepared like *Succus Hyoscyami.*)

### Tinctura Digitalis.

| | |
|---|---|
| Digitalis Leaves, in coarse powder ...... | 2½ ounces |
| Proof Spirit ........................ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

Dose—10 to 30 minims (1 grain of Digitalis in 9 minims).

*Antidotes.*—Friction and diffusible stimulants, with the external warmth well kept up.

**Substitutions.**—The leaves of *Verbascum Thapsus* (Mullein) may be at once distinguished from those of digitalis by being woolly on both surfaces.

## SUB-CLASS IV.—MONOCHLAMYDEÆ.

### [APETALÆ.]

Plants either monochlamydeous or achlamydeous.

## Natural Order.—POLYGONACEÆ.

Usually herbs with alternate leaves and ochreate stipules; flowers, usually hermaphrodite or rarely unisexual; calyx, inferior; ovary, superior and 1-celled; fruit, a triangular nut.

**RHEI RADIX, Rhubarb Root.**—The dried decorticated root of *Rheum officinale*, from China, Chinese Tartary and Thibet, and imported from Shanghai and Canton; and also brought overland by way of Moscow.

**Collection.**—The root is dug up early in autumn, its cortical layer pared off, and the remainder cut into suitable pieces, which after partially drying on a stove, are strung upon a cord and the drying completed spontaneously.

**Description.**—Sometimes in cylindrical and sometimes in plano-convex pieces, but very variable in shape and frequently pierced with a hole, in which may be found the remains of the string used to suspend the root while drying. The outer surface slightly shrivelled, and having here and there portions of the dark bark not thoroughly cut away. When broken transversely it is found to have medullary rays, in the shape of a number of short, broken, deep brown lines, traversing a whitish ground and forming a sort of internal ring of starlike spots. The interior of good rhubarb should be compact gritty, and finely veined, and there should be no decolorisation or sponginess. The yellow, dirty matter on the outside should not be turned red by a solution of boracic acid.

The source of the so-called Russian or Turkey Rhubarb has also been assigned to *Rheum palmatum* var. *Tanguticum.*

**Uses.**—Mild purgative, tonic and astringent; slowly empties the bowels, and afterwards acts as an astringent to confine them. Owing to this secondary action, it is exhibited in the first stage of diarrhœa, but it should not be given for constipation, unless combined with other purgatives. The dose in powder as a stomachic is 1 to 5 grains, and as a purgative 10 to 30 grains. The most useful way of administering rhubarb with the latter object is, however, undoubtedly in the form of Pulvis Rhei Compositus, stirred up in water with a little aromatic spirit of ammonia.

**Chemistry.**—The root of rhubarb contains starch, and is loaded with raphides of calcium oxalate. In good samples these constitute 35 to 40 per cent. of the root. The yellow colour is due to *chrysophanic acid*, $C_{14}H_8O_4$. It is crystalline yellow, slightly soluble in water; very soluble in alcohol and ether, and is turned dark red by alkalies. The red solution caused by caustic potash, if evaporated to dryness, turns first violet and finally blue during that process. It is volatilised by heat with yellow fumes.

Rhubarb also contains three resins, named Aporetin, Phæoretin and Erythroretin. Besides these it contains a considerable quantity of rheo-tannic acid, $C_{28}H_{26}O_{14}$, which is a yellow substance, soluble in water and alcohol, but insoluble in ether. It produces a greenish black precipitate with ferric sulphate and pale blue with ferrous salts. It is not really known to which of these substances the medicinal action of rhubarb is due.

### Extractum Rhei.

| | |
|---|---|
| Rhubarb, sliced or bruised | 16 ounces |
| Rectified Spirit | 10 fluid ounces |
| Distilled Water | 5 pints |

100 lbs. of sound root yield 39 lbs. of extract.

DOSE—5 to 15 grains. (1 grain is equal to about 3 grains of Rhubarb.

### Infusum Rhei.

| | |
|---|---|
| Rhubarb, in thin slices | ¼ ounce |
| Boiling Distilled Water | 10 fluid ounces |

Infuse in a covered vessel for 1 hour, and strain.

*Incompatibles*—The mineral acids, metallic solutions, some astringent infusions. Alkalies darken the colour, but do not decompose it.

DOSE—1 to 2 ounces.

### Pilula Rhei Composita.

| | |
|---|---|
| Rhubarb, in fine powder | 3 ounces |
| Socotrine Aloes, in fine powder | 2¼ ounces |
| Myrrh, in fine powder | 1½ ounce |
| Hard Soap, in powder | 1½ ounce |
| Oil of Peppermint | 1½ fluid drachm |
| Treacle, by weight | 4 ounces |

DOSE—5 to 10 grains. (2½ grains of Rhubarb and 2 grains of Aloes in 10 grains.)

### Pulvis Rhei Compositus. *(Dr. Gregory's Powder.)*

| | |
|---|---|
| Rhubarb, in powder .................. | 2 ounces |
| Light Magnesia ...................... | 6 ounces |
| Ginger, in powder .................... | 1 ounce |

Dose—20 grains to 1 drachm. (13 grains of Rhubarb in 60 grains.)

### Syrupus Rhei.

| | |
|---|---|
| Rhubarb Root, in coarse powder ........ | 2 ounces |
| Coriander Fruit ,, ........ | 2 ounces |
| Refined Sugar ....................... | 24 ounces |
| Rectified Spirit ....................... | 8 fluid ounces |
| Distilled Water ...................... | 24 fluid ounces |

Product, 37 ounces by weight, or 28 ounces by measure.

Dose—1 to 4 drachms.

### Tinctura Rhei.

| | |
|---|---|
| Rhubarb, in coarse powder ............ | 2 ounces |
| Cardamom Seeds, bruised.............. | ¼ ounce |
| Coriander, bruised .................... | ¼ ounce |
| Saffron .............................. | ¼ ounce |
| Proof Spirit.........................ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

Dose—Purgative, 4 drachms to 1 ounce. Stomachic, 1 to 2 drachms. (22 grains of Rhubarb in ½ fluid ounce.)

### Vinum Rhei.

| | |
|---|---|
| Rhubarb Root, in coarse powder ........ | 1½ ounce |
| Canella Alba Bark, in coarse powder .... | 60 grains |
| Sherry ..............................ad. | 20 fluid ounce |

Dose—1 to 2 drachms.

**Substitutions.**—1. East Indian rhubarb, an inferior variety, which is supposed to be the residue from which the refined rhubarb has been selected. It is hard and knotty, imperfectly trimmed, and has often brown or blackish stains.

2. Batavian, or Dutch trimmed rhubarb, is found in flattish pieces prepared in imitation of the so-called Turkey rhubarb.

3. English rhubarb is the root of *Rheum Rhaponticum*, cultivated in England at Banbury, in Oxfordshire. It is usually in sticks, or semi-cylindrical pieces, and more spongy in texture; differing somewhat in odour from true rhubarb. It may be distinguished by the entire absence of the star-like spots above mentioned; or, if they be present, they are never arranged in an irregular ring.

**Adulterations.**—Powdered rhubarb is frequently adulterated with starch and turmeric. The former may be discovered by the microscope, and the latter by a solution of boracic acid.

## NATURAL ORDER.—PIPERACEÆ.

**PIPER NIGRUM, Black Pepper.**—The dried unripe berries of the *Piper nigrum*, from the East Indies.

**Botanical Source.**—The *Piper nigrum* is a perennial plant with a trailing or climbing stem, bearing spikes of sessile fruits about the size of a pea, at first red, but black when ripe.

**Collection.**—The berries are gathered before they are ripe, and dried in the sun. The proper stage for picking is when one or two berries at the base of the spike turn red.

**Description.**—Small round wrinkled berries, without stalks, brownish black externally, with a characteristic odour and taste of pepper.

**Chemistry.**—Pepper contains from 1 to 2 per cent. of a volatile oil, and an acrid resin which is soluble in alcohol and ether, and appears to be the pungent principle. Pepper also contains from 2 to 3 per cent. of a substance isomeric with morphia, called *piperia* or *piperine;* its formula is $C_{17}H_{19}NO_3$. It is a neutral crystalline body, insoluble in water, fusible at 212° F., volatile and soluble in alcohol, acetic acid, and ether. By the action of nitric acid it is decomposed into piperic acid and *piperidia,* $C_5H_{11}N$, which latter is an oily volatile alkaloid, having the smell of pepper and ammonia combined. An odour of benzoic aldehyd is given off during the process of its formation.

**Confectio Piperis.**

| | |
|---|---|
| Black Pepper, in fine powder .......... | 2 ounces |
| Clarified Honey ...................... | 15 ounces |
| Carraway Fruit, in fine powder ........ | 3 ounces |

DOSE—1 to 2 drachms (6 grains of Pepper in 1 drachm).

Also an ingredient in Confectio Opii (1 in 31) and Pulvis Opii Compositus (1 in 7½).

**Adulterations.**—Whole pepper is tolerably clean when imported, but when ground is subject to many adulterations—such as starch, linseed and pea-meal, or sand, all of which may be detected by the microscope.

**PIPER ALBUM, White Pepper.**—The produce of the same plant as black pepper, only in this case the fruit has been allowed to ripen, and the pulpy portion removed by soaking in water and rubbing. In all other points white pepper agrees with black.

**PIPER LONGUM, Long Pepper.**—The dried spadices of *Piper officinarum* and *Piper longum*, imported from India, Singapore, and Batavia.

Not official.

**Description.**—A spike containing a multitude of minute baccate fruits, closely packed, about 1½ inch long and about ¼ inch thick, greyish white in colour, becoming when wetted deep reddish brown.

**Uses.**—Employed as a spice, and in veterinary medicine.

**Chemistry.**—Similar to that of ordinary pepper.

**CUBEBA, Cubebs.**—The dried unripe fruit of *Cubeba officinalis*, wild and cultivated in Java.

**Botanical Source.**—A climbing plant similar to pepper, but having the flowers in racemes, with short foot stalks instead of spikes.

**Description.**—About the size of black pepper, but readily distinguished by having foot stalks attached (*Piper caudatum*) and by its characteristic odour.

**Uses.**—Either powdered cubebs or the oil is a mucous stimulant in gonorrhœa, but if used in the former state it should be freshly ground to evince real activity.

Dose of the powder, ½ to 2 drachms, stirred up in a large quantity of water.

**Chemistry.**—The active principle is a volatile oil, and it also contains an inert crystalline substance called cubebin, very similar to piperine.

**Cubebæ Oleum,** *Oil of Cubebs.*—The volatile oil obtained in Britain by distilling cubebs with steam, between 450° and 480° F. It is colourless or pale greenish yellow, and is polymeric with oil of turpentine, its formula being $C_{30}H_{48}$. In cold weather it deposits crystals of *cubebene-hydrate*, $C_{30}H_{48}2H_2O$, commonly called cubeb camphor. Cubebs yield from 10 to 15 per cent. of volatile oil.

Dose, 5 to 20 minims.

**Tinctura Cubebæ.**

| | |
|---|---|
| Cubebs, in powder .................... | 2½ ounces |
| Rectified Spirit ....................ad. | 20 fluid ounces |

Dose—½ to 2 drachms (7 grains of Cubebs in 1 fluid drachm).

**MATICÆ FOLIA, Matico Leaves.**—The dried leaves of ***Piper angustifolium*** (***Artanthe elongata***, B.P.) imported from Huanuco, and other parts of Peru.

**Botanical Source.**—A small rough-leafed shrub, growing in the moist woods of Bolivia, Peru, Brazil, and Venezuela.

**Description.**—As found in commerce it is in a mass of more or less broken leaves, which are noticed to be thick, acuminate, at the apex; and cordate and unequal at the base. They are tesselated on the upper surface, and downy on the under surface.

*Artanthe adunca* is another species of Matico, the leaves not reticulated on the upper and downy on the under surface.

**Uses.** — As a powerful topical astringent, and hæmostatic (αἷμα blood).

**Chemistry.**—Matico contains a little volatile oil, a trace of tannic acid, a little resin, and a crystallisable acid called artanthic acid. Infusion of Matico becomes dark when mixed with ferric chloride.

**Infusum Maticæ.**

| | |
|---|---|
| Matico Leaves, cut small .............. | ½ ounce |
| Boiling Distilled Water................ | 10 fluid ounces |

Infuse in a covered vessel for ½ hour, and strain.

*Incompatibles*—Salts of iron.

Dose—1 to 4 ounces.

## NATURAL ORDER.—THYMELACEÆ.

Usually shrubs with entire and exstipulate leaves and hermaphrodite flowers; calyx, inferior, imbricated; stamens, inserted on the calyx, and twice as many as its lobes; ovary, superior and 1-celled; fruit, usually drupacious.

**MEZERII CORTEX,** Mezereon.—The dried bark of *Daphne Mezereum* and *Daphne Laureola* (Spurge Laurel), cultivated in England and Central Europe, wild near Andover.

**Botanical Source.**—The *D. Mezereum* is a small shrub with evergreen, lanceolate, smooth leaves; and rose-coloured flowers appearing in almost sessile bunches of three, before the leaves. The calyx is monosepalous; the corolla wanting; and the stamens eight, inserted inside the calyx in two rows; the fruit is baccate, red, and fleshy. The *D. Laureola* is a small shrub, with spathulate, evergreen, smooth and entire leaves. The flowers are like those of *D. Mezereum*, monochlamydeous. They are yellowish green, and are arranged in axillary cymes. The fruit is baccate and black.

**Description.**—A tough and pliable, fibrous bark; olive brown externally; and white and satiny internally, with a faint odour, and acrid taste.

**Uses.**—Emetic and purgative in large doses. In small doses diuretic. Externally, a powerful local irritant. The etherial extract is a constituent of *linimentum sinapis compositum.* The bark is an ingredient in compound decoction of sarsaparilla, 60 grains to the pint.

**Chemistry.**—The bark contains a volatile oil and a glucoside, called *Daphnin* $C_{31}H_{34}O_{19}$, which, when boiled with a dilute acid, yields Daphnetin ($C_{19}H_{14}O_{9}$) and sugar; but the real active principle is an acrid resin, which has not been properly investigated. The bark will give up its acrid properties to water, vinegar, spirit and oils.

**Extractum Mezerei Æthereum:**

| | |
|---|---|
| Mezereon Bark, cut small | 16 ounces |
| Rectified Spirit | 8 pints |
| Ether | 1 pint |

## NATURAL ORDER.—LAURACEÆ.

**CAMPHORA, Camphor.**—The concrete volatile oil obtained from the wood of *Cinnamomum Camphora* (*Camphora officinarum*), imported in a crude state from China and Japan, and purified by sublimation in this country.

**Botanical Source.**—The *Camphora officinarum* is a handsome, evergreen tree, abounding in the Eastern provinces of China, and in the Island of Formosa. Its wood is much used in China for making cabinets, as it resists the attacks of insects.

**Collection.**—Camphor, which is diffused through the whole plant, is obtained by cutting the wood into small chips and boiling with water, when the camphor volatilises with the steam, and is collected in inverted copper pots. On its arrival in this country, it is re-sublimed into thin glass vessels (*bomboloes*), which are then broken, and the pure camphor taken out, in a bell-shaped cake, about 3 inches thick.

**Uses.**—Diaphoretic and anti-spasmodic. Good in fever, mania, spasmodic diseases, and recently recommended in diarrhœa. In large doses it is a sedative. Dose, 2 to 10 grains.

**Chemistry.**—It is white, translucent and crystalline, having the formula $C_{10}H_{16}O$, and its sp. gr. is ·996. It volatilises slowly at ordinary temperatures, the sp. gr. of its vapour being 5·3. It is soluble in 1,300 parts of water; but freely soluble in rectified spirit, chloroform, ether, acetic acid, and the volatile and fixed oils. It melts at 288° F.; boils at 400° F., and burns in the air with a clear, bright flame. By distillation with phosphoric anhydride, it loses water and becomes converted into cymol $C_{10}H_{14}$; and when heated with oxidising agents, such as nitric acid, it is slowly oxidised, first into *camphoric acid* $C_{10}H_{16}O_4$, and afterwards into *camphoretic acid* $C_{10}H_{14}O_7$.

**Aqua Camphoræ.**

| | |
|---|---|
| Camphor, in small pieces | ½ ounce |
| Distilled Water | 1 gallon |

DOSE—1 to 2 ounces. (About ½ grain of Camphor in 1 fluid ounce.)

**Linimentum Camphoræ.**

| | |
|---|---|
| Camphor | 1 ounce |
| Olive Oil | 4 fluid ounces |

**Linimentum Camphoræ Compositum.**

| | |
|---|---|
| Camphor | 2½ ounces |
| Oil of Lavender | 1 fluid drachm |
| Strong Solution of Ammonia | 5 fluid ounces |
| Rectified Spirit | 15 fluid ounces |

**Spiritus Camphoræ.**

| | |
|---|---|
| Camphor | 1 ounce |
| Rectified Spirit | 9 fluid ounces |

DOSE—10 to 30 minims. (1 in 10.)

**Tinctura Camphoræ Composita.** (*Vide* page 54.)

Camphor is also contained in Unguentum Plumbi Subacetatis Compositum, Unguentum Hydrargyri Compositum, and all liniments except Ammoniæ, Calcis, Crotonis, Opii and Potassii Iodidi.

Other varieties of camphor are :—1. Borneo camphor, obtained from *Dryobalanops aromatica.* It consists of Borneol, and is harder than common camphor. It is not so volatile, and has more the odour of patchouli. Its formula is $C_{10}H_{18}O$, and it is converted into common camphor by the action of nitric acid.

2. Ngai camphor is the produce of *Blumea balsamifera*, which is known to the Chinese, and stands in value between ordinary and Borneo camphor. It has been found to be similar in composition to *Borneo camphor.*

**CINNAMOMI CORTEX, Cinnamon Bark.**—The inner bark of shoots from the truncated stocks of *Cinnamomum Zeylanicum*, imported from Ceylon.

**Botanical Source.**—The *C. Zeylanicum* is a small evergreen tree, with shining leaves and panicles of greenish flowers.

**Collection.**—The stems of the trees are cut down so as to form "stools," from which young shoots spring. They are cut when about two years old, in May and December, and the bark is then cut longitudinally and peeled off, and placed on a convex piece of wood so that it contracts into quills, which are dried first in the shade and afterwards in the sun.

**Description.**—In close double-rolled quills of a light yellowish brown, which break readily into fragments, having a characteristic odour and an aromatic taste. A cold decoction should give no distinct blue with tincture of iodine.

**Uses.**—Aromatic, stimulant, and slightly astringent. Useful in nausea and flatulence, and to conceal the taste of other remedies.

Dose, in powder, 5 to 20 grains.

**Chemistry.**—The active principle is a volatile oil, of which good cinnamon yields nearly 1 per cent. It also contains sugar, starch, mucilage, and tannic acid; and it is the presence of the latter in considerable proportion which, taken together with a small quantity of starch, causes the imperfection of the iodine reaction as already noticed.

**Cinnamomi Oleum** B.P., *Oil of Cinnamon.*—The oil distilled from the cinnamon bark, after a preliminary maceration in a saturated solution of common salt, about 1 ounce being usually obtained from 10 lbs. of cinnamon.

**Description.**—Yellowish when fresh, becoming red by keeping; sp. gr. 1·035; boiling point from 428° to 446° F.

**Chemistry.**—Oil of cinnamon is chiefly composed of cinnamic aldehyd (*cinnamyl hydride*, $C_9H_7OH$), which may be precipitated by shaking the oil with potassium bisulphite. This substance is a colourless oil, rapidly oxidising in the air, and becoming coloured owing to the formation of solid resin and *cinnamic acid*, $HC_9H_7O_2$.

**Cinnamic Acid** resembles benzoic acid in its crystals, is slightly soluble in cold water, freely soluble in alcohol, fusible and volatile by heat. When distilled with barium hydrate, carbonic anhydride is given off, and the hydrocarbon of the series *styrol* or *cinnamol*, $C_8H_8$, is produced.

By distilling cinnamic acid with oxidising agents, such as nitric acid or potassium dichromate and sulphuric acid, it is converted into benzoic aldehyd (volatile oil of bitter almonds) and benzoic acid.

**Aqua Cinnamomi.**

| | |
|---|---|
| Cinnamon Bark, bruised .............. | 20 ounces |
| Water ............................ | 2 gallons |

Distil 1 gallon. (1 of Bark in 8.)

**Pulvis Cinnamomi Compositus.**

| | |
|---|---|
| Cinnamon, in fine powder .............. | 1 ounce |
| Ginger „ .............. | 1 ounce |
| Cardamoms „ .............. | 1 ounce |

Dose—3 to 10 grains.

**Tinctura Cinnamomi.**

| | |
|---|---|
| Cinnamon, in coarse powder............ | 2½ ounces |
| Proof Spirit.......................ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

Dose—½ to 2 drachms. (7 grains of Cinnamon in 1 fluid drachm.)

Also an ingredient in Acidum Sulphuricum Aromaticum, Decoctum Hæmatoxyli, Infusum Catechu, Pulvis Catechu Compositus, Pulvis Cretæ Aromaticus, Pulvis Kino Compositus, Tinctura Cardamomi Composita, Tinctura Catechu, Tinctura Lavandulæ Composita, and Vinum Opii.

**CASSIÆ CORTEX, Cassia Bark.**—The dried bark of *Cinnamomum Cassia*, imported from China and Java.

**Botanical Source.**—A tree similar to cinnamon.

**Description.**—Larger than cinnamon, and the quills never in double rolls. It also breaks with a shorter fracture, and a cool decoction gives a blue with tincture of iodine.

**Uses.**—Similar to cinnamon.

**Chemistry.**—Contains an essential oil exactly similar in a chemical point of view to cinnamon, but not so fine in flavour; and, therefore, commercially, not so valuable. The bark also contains tannic acid.

**LAURI FRUCTUS, Bayberries.**—The dried berries of *Laurus nobilis*, cultivated in England, and imported from the south of Europe. Not official.

**Botanical Source.** — It is an evergreen plant, with oblong lanceolate leaves, with a wavy margin; inflorescence in axillary umbels. The berry egg-shaped, and bluish black, and 1-seeded.

**Description.**—Dried bayberries are egg-shaped; a little larger than *Cocculus Indicus;* dark brown in colour, with a wrinkled pericarp, to which the seed is not attached. When shaken near the ear they are heard to rattle. They contain both a volatile and a fixed oil, and have now almost entirely fallen out of use.

**NECTANDRÆ CORTEX, Bebeeru Bark.** — The dried bark of *Nectandra Rodiæi* (Greenheart), imported from British Guiana.

**Botanical Source.**—The *Bebeeru*, or greenheart, is a lofty tree, which is a native of British Guiana. In flat pieces about ¼ inch thick, externally greyish brown, internally dark cinnamon brown. Strongly bitter and astringent to the taste.

**Chemistry.**—It contains resin, tannic acid, and about 2·5 per cent. of *beberia*, $C_{35}H_{40}N_2O_6$, which is a colourless amorphous alkaloid, very slightly soluble in water, and more so in ether, but most of all in absolute alcohol. It is soluble in dilute acids, forming yellow uncrystallisable salts.

**Beberiæ Sulphas**, sulphate of beberia,

$$C_{35}H_{40}N_2O_6.H_2SO_4,$$

is prepared, according to the B.P., by the following process:—Acidulate 1 gallon of water with ½ fluid ounce of sulphuric acid, and with this exhaust 1 lb. of coarsely powdered beberu bark. Concentrate to 1 pint; and, when cold, add gradually a little milk of lime, until the fluid is nearly saturated, but still retains a distinct acid re-action. After two hours filter and wash the precipitate, and add to the filtrate a slight excess of solution of ammonia. Collect the precipitate, and wash it twice with 10 ounces of cold water. Then squeeze, and dry the precipitate on a water-bath. Pulverise the dry precipitate and exhaust it with boiling rectified spirit. Add a little water, and recover the spirit by distillation. Add a slight excess of sulphuric acid to the remainder, and evaporate to dryness in a water-bath. Pulverise the residue, and treat it with 1 pint of cold water; filter; evaporate to the consistence of syrup, and separate it on plates and dry at a heat not exceeding 140° F.

By this process the sulphate is not produced perfectly pure. The addition of the lime neutralises the greater part of the acid first employed, and precipitates some of the natural acids of the bark. The ammonium hydrate precipitates the crude alkaloid, which is purified by solution in spirit and converted into sulphate. As thus prepared, the sulphate is in dark brown translucent scales; soluble in water and alcohol, and strongly bitter. The aqueous solution gives a white precipitate with barium chloride, proving the presence of sulphuric acid, and the addition of caustic soda to another portion, causes the precipitation of beberia as a yellowish white deposit, which is dissolved when the mixture is shaken up with twice its bulk of ether. The etherial solution leaves, on evaporation, a yellow translucent residue, entirely soluble in diluted sulphuric acid.

**SASSAFRAS RADIX, Sassafras Root.**—The dried root of *Sassafras officinale*, from North America.

**Botanical Source.**—The *Sassafras officinale* is a small, diœcious tree common throughout the United States.

**Description.** — In light, porous, greyish yellow chips; and also in branched pieces, sometimes 8 inches in diameter at the crown. The bark is externally greyish brown; and internally, reddish brown; of a characteristic odour, and aromatic taste. The active principle is the essential oil, which resides chiefly in the bark of the root. It has a sp. gr. of 1·09; and, at a low temperature, it deposits crystals of sassafras camphor. The oil has been found to consist of an elœopten, isomeric with turpentine, $C_{10}H_{16}$, and a liquid body called safrol, $C_{10}H_{10}O_2$, forming with bromine characteristic crystals of a substitution product, having the formula $C_{10}H_5Br_5O_2$; melting at 338° F.

Sassafras root also contains tannic acid, and a colouring matter analagous to cinchona-red.

**Uses.**—Sudorific, stimulant and diaphoretic; also used as an adjunct to perfumery.

**Preparations.**—An ingredient in *Decoctum Sarsæ Compositum*, ¼ ounce to 1 pint.

## NATURAL ORDER.—MYRISTICACEÆ.

**MYRISTICA, Nutmeg.**—The kernel of the seed of ***Myristica officinalis***, cultivated in the Banda Islands of the Malayan Archipelago.

**Botanical Source.**—The ***M. Officinalis*** is an evergreen tree, cultivated in Sumatra, Malacca and Singapore, but truly indigenous to the Malacca Islands. It bears nearly spherical drupes, about the size of a peach, the seed is covered with a scarlet-coloured arillode, which, on exposure, by the spontaneous splitting open of the pericarp, when the fruit is ripe, turns yellow.

**Collection.**—When the pericarp splits, the fruit is collected, and the arillode carefully separated, dried and sold as mace. The seeds are thus isolated, dried by stove heat, until the kernels rattle in the shell, which latter is then broken, and the nutmeg rubbed over with dry lime and packed.

**Description.**—Oval, about an inch long; externally reticulated, and internally greyish red, with dark brown veins

**Uses.**—Stimulant and carminative.

**Chemistry.**—Nutmegs contain about 25 per cent. of fixed oil and 2 to 3 per cent. of volatile oil.

**Oleum Myristicæ Expressum,** expressed oil of nutmeg; butter or oil of mace; a concrete oil obtained from nutmegs by expression and heat.

This substance is a firm fat with an aromatic odour, and orange-red colour, imported from Singapore in blocks, enveloped in palm leaves. It is soluble in four parts of warm rectified spirit. It contains 6 per cent. of a volatile oil, and is otherwise a mixture of fats, the chief of which is *myristicin* $C_3H_5 3C_{14}H_{27}O_2 (C_{45}H_{86}O_6)$, which constitutes about half the weight of the expressed oil. It is soluble in ether, but insoluble in cold alcohol, and when saponified it yields myristic acid $HC_{14}H_{27}O_2$.

**Oleum Myristicæ,** volatile oil of nutmeg, obtained in England by distilling nutmegs with water.

This oil is straw-yellow, sp. gr. ·93; boiling point 329° F., with a powerful odour of nutmeg. It chiefly consists of a hydro-carbon isomeric with turpentine, $C_{10}H_{16}$. It is an ingredient in Pilula Aloes Socotrinæ.

**Spiritus Myristicæ.**

| | |
|---|---|
| Volatile Oil of Nutmeg | 1 fluid ounce |
| Rectified Spirit | 49 fluid ounces |

DOSE—½ drachm to 1 drachm, (1-5th the strength of 1864.)

Nutmeg is also an ingredient in Pulvis Catechu Compositus (1 in 10); Pulvis Cretæ Aromaticus (1 in 16); Spiritus Armoraciæ Compositus, and Tinctura Lavandulæ Composita.

**Adulterations.**—Long or wild nutmegs, the produce of *Myristica fatua*, recognised by their shape.

## NATURAL ORDER.—ULMACEÆ.

**ULMI CORTEX, Elm Bark.**—The dried inner bark of *Ulmus campestris*, indigenous.

**Botanical Source.**—The well known common elm tree.

**Collection.**—The bark should be taken from the tree in early spring, and then deprived of its epiphlœum, and dried.

**Description.**—A tough brownish yellow bark, in broad flat pieces, about 1-8th of an inch thick; smooth on both surfaces, with broad marks where the knife has removed the outer layer.

**Uses.**—Demulcent and astringent. Administered in chronic skin diseases.

**Chemistry.**—It contains ulmin; about 3 per cent. of tannic acid, with a little resin, gum and mucilage. Its decoction is precipitated by gelatin, and turned green by ferric chloride.

**Decoctum Ulmi.**

| | |
|---|---|
| Elm Bark, cut in small pieces .......... | 2½ ounces |
| Distilled Water ....................ad. | 20 fluid ounces |

Boil 10 minutes.

Dose—2 to 4 ounces.

## NATURAL ORDER.—CANNABINACEÆ.

CANNABIS INDICA, Indian Hemp.—The dried flowering tops of the female plant of *Cannabis sativa*, from India, Herat and Persia.

**Botanical Source.**—The *C. sativa* is a diœcious annual, with an erect stem and digitate leaves, of from 5 to 7 narrow lanceolate and serrated leaflets. Male flowers in drooping panicles; female flowers in strobile-like racemes with leafy bracts, and a perianth covered with short brownish glands embracing the ovary. The fruits are small grey nuts, containing a single seed, and known in commerce as hemp seed.

**Uses.**—Narcotic and anti-spasmodic. It has been used with some success in neuralgia, tetanus, and even in hydrophobia, and the tincture has been exhibited with benefit in difficult menstruation.

The tincture, the colour of which is intensely green, gives a whitish precipitate of resin when mixed with water; mucilage, therefore, should always be added in order to suspend the resin.

**Chemistry.**—The essential principles are a volatile oil and a resin, of which the latter is the chief active constituent. Good hemp should yield 7 per cent. of this resin, when treated with strong alcohol. It is blackish grey in colour, soluble in ether and in fixed and volatile oils. The volatile oil exists in the dried hemp to the extent of about ·3 per cent. It consists of two hydro-carbons—*cannabene* $C_{18}H_{20}$, and *cannabene* *hydride* $C_{18}H_{22}$. It has been asserted by some that this is almost as important a principle as the resin.

**Extractum Cannabis Indicæ.**

| | |
|---|---|
| Indian Hemp, in coarse powder | 16 ounces |
| Rectified spirit | 4 pints |

Dose—¼ to 1 grain.

**Tinctura Cannabis Indicæ.**

| | |
|---|---|
| Extract of Indian Hemp | 1 ounce |
| Rectified Spirit ad. | 20 fluid ounces |

Dose—5 to 20 minims. (1 grain of Extract in 22 minims.)

*Antidotes*—Give hot brandy and water, allow the patient to sleep, and apply a blister to the nape of the neck, if necessary, to control its violent action.

**LUPULUS, Hop.**—The dried strobiles of the female plant of *Humulus Lupulus*, cultivated in England and many parts of Europe and North America.

**Botanical Source.**—It is a twining plant, with opposite, palmate, serrated and stipulate leaves. The flowers are diœcious: the males in axillary panicles, and the females in strobiles with concave, membranous bracts, each of which has a fruit, at its base covered with yellow, aromatic glands.

**Uses.**—Aromatic and tonic. Slightly sedative and soporific, but uncertain in its action in the latter respect.

**Chemistry.**—The active principle of the hop exists in the lupulinic glands above described as covering the fruit, 6 lbs. of hops yielding about 6 ounces. These yellow grains are called lupulin, and have been found to contain 2 per cent. of volatile oil, 10 per cent. of bitter extractive, and 55 per cent. of resin. The active principle of hops may be extracted by spirit, water and petroleum ether.

### Extractum Lupuli.

| | |
|---|---|
| Hops | 16 ounces |
| Rectified Spirit | 1½ pint |
| Distilled Water | 1 gallon |

Dose—5 to 15 grains.

### Infusum Lupuli:

| | |
|---|---|
| Hops | ½ ounce |
| Boiling Distilled Water | 10 fluid ounces |

Infuse in a covered vessel for 2 hours, and strain.

*Incompatibles*—Mineral acids; metallic salts.

Dose—1 to 2 ounces.

### Tinctura Lupuli.

| | |
|---|---|
| Hops | 2½ ounces |
| Proof Spirit ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

*Incompatibles*—The salts and preparations of iron.

Dose—½ to 2 drachms.

## NATURAL ORDER.—MORACEÆ.

**CARICÆ, Figs.**—The dried fruit of ***Ficus Carica***, imported from Asiatic Turkey, Spain, and Portugal. [*Artocarpeæ*, Hanbury.]

**Botanical Source.**—The *F. Carica* is a tree with large rough palmate leaves. Inflorescence is a hypanthodium, which gives birth to an anthocarpous or collective fruit called a syconus.

**Uses.**—Slightly laxative, and an ingredient in Confection of Senna.

**Chemistry.**—It has not been fully investigated, but contains a large quantity of grape sugar, which constitutes nearly 70 per cent. of the dried fruit.

**MORI SUCCUS, Mulberry.**—The juice of the ripe fruit of ***Morus nigra***.

**Botanical Source.**—A tree with alternate, slightly cordate, acuminate, serrated, pubescent, and stipulate leaves. The flowers are monœcious—male flowers in a spike, and female flowers in catkins. The fruit is a black sorosis.

**Description.**—Dark violet colour, with an acidulous taste; contains a large quantity of grape sugar, and nearly 2 per cent. of malic acid.

**Syrupus Mori.**—The fruit from which the juice is pressed should be perfectly ripe, and used immediately after it is gathered.

USES.—Refrigerant and slightly laxative, and administered to children; employed as a colouring agent.

## NATURAL ORDER.—EUPHORBIACEÆ.

Herbs, shrubs, or trees with an acrid milky juice; flowers, unisexual, monœcious or diœcious; calyx, sometimes present, but frequently absent, both the male and female flowers being enclosed in an involucre furnished with glands; male flowers, with one or more stamens and 2-celled anthers; female flowers, with superior, usually 3-celled ovary, frequently supported on a gynophore, with 1 or 2 suspended ovules in each cell; fruit, tricoccus.

**CASCARILLÆ CORTEX.**—The dried bark of *Croton Eluteria*, from the Bahama Islands.

**Description.**—In quills, 2 or 3 inches in length and from 2 to 5 lines in diameter, dull brown, and coated with white crustaceous lichen; breaks with a short resinous fracture, and emits a fragrant odour when burnt.

**Uses.**—Aromatic stimulant and tonic, and to some extent febrifuge. It is usually prescribed in dyspepsia, cholic, and general debility. It is a constituent in fumigating pastilles.

**Chemistry.**—The bitter principle is called *cascarillin* $C_{12}H_{18}O_4$. It is a neutral substance freely soluble in ether and hot alcohol, but sparingly soluble in water and chloroform. The bark also contains 1 per cent. of volatile oil and 15 per cent. of resin, with gum and tannin. Tincture of Cascarilla becomes milky when poured into water.

**Infusum Cascarillæ.**

| | |
|---|---|
| Cascarilla Bark ...................... | 1 ounce |
| Boiling Distilled Water ................ | 10 fluid ounces |

Infuse in a covered vessel 1 hour, and strain.

*Incompatibles*—Lime water, metallic salts, mineral acids.

Dose—1 to 2 ounces.

**Tinctura Cascarillæ.**

| | | |
|---|---|---|
| Cascarilla Bark, bruised | ............... | 2½ ounces |
| Proof Spirit.......................... | ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

Dose—½ to 2 drachms. (7 grains of Cascarilla in 1 fluid drachm.)

**Adulterations.**—The bark of *Croton lucidus* has lately been met with mixed with cascarilla. It is very similar in appearance, but its tincture does not precipitate in water.

TIGLII SEMINA. — The seeds of *Croton Tiglium*, imported from Ceylon and the Indian Archipelago.

**Botanical Source.**—The *C. Tiglium* is a small tree, indigenous to the Malabar coast, with brown, 3-celled capsules, each cell containing one seed.

**Description.**—Egg-shaped seeds, about ½ inch long, with a bright cinnamon-brown coat, which is easily scraped off, showing a black testa beneath. From the hilum the raphè is seen to run to the other end of the seed terminating in the chalaza, which is easily visible as a dark spot.

**CROTONIS OLEUM, Croton Oil.**—The oil expressed from the seeds, which yield from 50 to 60 per cent.

**Description.**—It is a brownish yellow, viscid oil, with a very burning taste.

**Uses.**—Drastic purgative, in doses of 1-3rd to 1 minim. Applied to the skin it produces pustules. May be administered, made into a pill with bread crumb, cacoa butter, or soap.

*Antidotes*—Emetics, followed by mucilaginous drinks and opium.

**Chemistry.**—The true irritant principle has not been isolated, but in addition to the ordinary fixed oils it is found to contain acetic, butyric, valerianic, *tiglinic* ($C_5H_8O_2$), and *crotonic* acids $C_4H_6O_2$, all of which are volatile fatty acids.

**Linimentum Crotonis.**

| | |
|---|---|
| Croton Oil | 1 fluid ounce |
| Oil of Cajuput | 3½ fluid ounces |
| Rectified Spirit | 3½ fluid ounces |

(1 of Croton Oil in 8.)

**EUPHORBIUM, Euphorbium.**—The acrid resinous exudation from incisions in the stem of *Euphorbia resinifera*, imported from Mogadore, and a native of Morocco.

**Description.**—In regular pieces of dull yellowish brown waxy-looking matter, sometimes hollow in the centre, but generally enclosing a spine or fragment of the flower stalk. The dust, when inhaled, causes violent sneezing. It contains an amorphous resin soluble in alcohol, and with an acrid burning taste; and also *euphorbon*, which crystallises from ether, and is free from acridity. If euphorbon be moistened with a little sulphuric acid, a fine violet is produced on the careful addition of nitric acid.

**Uses.**—Powerful irritant; now only used as an ingredient in paint for preventing the attacks of insects.

**RICINI SEMINA.**—The seeds of *Ricinus communis*, from the East Indies.

**Botanical Source.**—The *R. communis* is a perennial plant, but when cultivated in England becomes annual, owing to its being unable to withstand the winter. The leaves are large, simple, palmatifid, peltate, and serrated. The flowers are monœcious in terminal panicles; the lower usually male, and the upper female. The fruit is a tricoccus capsule, covered with spines and having 3 cells, each cell being 1-seeded.

**Description.**—Grey shining seeds, with brownish black bands or spots, about 6-10ths of an inch in length, and 4-10ths wide. They are, as a rule, both larger and flatter than croton seeds.

**Chemistry.**—The active principle is a fixed oil, of which they afford about 50 per cent.

**RICINI OLEUM, Castor Oil.**—The oil expressed from the seeds above described, imported chiefly from Calcutta.

**Description.**—A viscid colourless or very pale yellow oil; sp. gr. ·96. It does not entirely solidify at zero, and when exposed to the air in thin layers it dries.* It is miscible in all proportions with absolute alcohol and in glacial acetic acid, and is soluble in twice its bulk of rectified spirit.

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* Although *Ol. Ricini* does not entirely solidify until cooled to —18° C. it throws down a considerable white deposit in extreme cold, which makes keeping it in large stock very unprofitable.

**Uses.**—A rapid but mild cathartic; very useful as a purgative for women and children, and in diseases accompanied by inflammatory action in the bowels.

Infant dose, 1 to 3 drachms; adult dose, ½ to 1 ounce, in an emulsion with yolk of egg or mucilage, the yellow of one egg being sufficient to suspend an ounce of oil.

**Chemistry.**—Castor oil is a mixture of olein with a little palmatin. The olein, however, is peculiar to castor oil, yielding, when saponified, *ricinoleic acid*, $C_{18}H_{34}O_3$. By treatment with ammonia, ricinolein yields a solid crystalline substance, *ricinolamide*, $C_{18}H_{35}NO_2$.

**Varieties.**—The finest castor oil is that produced by expression without heat, and afterwards bleached by exposure to the sun on the roofs of houses; the second variety is known as Calcutta oil, prepared by heat; and of late years a quantity of Italian oil has come into the market, which is very tasteless. It is expressed from seeds grown in Italy, and also from those imported for the purpose from India.

**Adulteration.**—Castor oil is sometimes adulterated with olive or lard oils, which may be distinguished by their insolubility in rectified spirit.

**Collodium Flexile.**

| | |
|---|---|
| Collodion | 6 fluid ounces |
| Canada Balsam | 120 grains |
| Castor Oil | 1 fluid drachm |

Castor oil also enters into the composition of Linimentum Sinapis Compositum and Pilula Hydrargyri Subchloridi Composita.

**KAMALA.**—A powder consisting of the minute glands which cover the capsules of *Rottlera tinctoria*, imported from India.

**Botanical Source.**—The *R. tinctoria* is a shrub, or small tree, with diœcious flowers in terminal panicles. The tricoccus capsule, which ripens in spring, is covered with minute, sessile, bright red glands.

**Description.**—Kamala is a fine granular, mobile powder, brick-red in colour, which mixes difficultly with water, but yields its colouring matter to alcohol, ether, chloroform, benzol, acetic acid, and potassium hydrate. Heated in a flame it ignites like lycopodium, and leaves only 1¼ per cent. of a grey ash.

**Uses.**—For the expulsion of *tænia*. Dose, 30 grains to ¼ of an ounce, given in a little strong brandy-and-water.

**Chemistry.**—Kamala contains traces of tannic acid, gum, volatile oil, and 80 per cent. of *rottlerin* $C_{22}H_5O_6$. This is a reddish yellow resin extracted by ether, which appears to be a compound of two other resins differing only in their degree of solubility and in their melting point.

## NATURAL ORDER.—ARISTOLOCHIACEÆ.

**ARISTOLOCHIÆ RADIX, Birthwort.**—The dried root of *Aristolochia longa*, or *A. rotunda*, found in England, and also imported from Southern Europe.

This root is not now officially prescribed in medicine, but is frequently employed by herbalists for criminal purposes, on account of its so-called emmenagogue properties. It was also an ingredient in a once famous remedy for gout, known as the Duke of Portland's powder. Like serpentary it contains a little essential oil and a bitter principle apparently identical with *aristolochin*, but which has never really been properly investigated. The dose in powder is from 20 to 60 grains.

## SERPENTARIÆ RADIX,

**Serpentary Root, and Virginian Snake Root.**—The dried root of ***Aristolochia Serpentaria***, from Southern parts of North America.

**Botanical Source.**—A herb with a perennial stalk, growing in shady woods, and producing small dull purple flowers.

**Description.**—A knotted, contorted rhizome, about 1 inch in length by 1-8th of an inch in thickness; bearing on its under side a bunch of numerous slender matted rootlets, about 3 inches long. It is dull yellowish brown in colour, and has an aromatic odour and taste.

**Uses.**—Diaphoretic, diuretic, stimulant and tonic. Said to be useful in chronic rheumatism, dyspepsia, low fever, and as a promoter of eruption in *exanthemata.* It is useful in certain stages of typhus, and its action in many cases is similar to that of guaiacum, only not so irritating to the bowels.

**Chemistry.**—Serpentary contains about ½ per cent. of volatile oil, and the same of resin. The outer layer contains tannin, and also an amorphous bitter principle precipitated by lead acetate.

**Infusum Serpentariæ.**

| | |
|---|---|
| Serpentary Root ...................... | ¼ ounce |
| Boiling Distilled Water ................ | 10 fluid ounces |

Infuse in a covered vessel for 2 hours, and strain.

Dose—1 to 2 ounces.

**Tinctura Serpentariæ.**

| | |
|---|---|
| Serpentary Root, in coarse powder ...... | 2½ ounces |
| Proof Spirit ........................ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

Dose—½ to 2 drachms. (7 grains of Serpentary Root in 1 fluid drachm.)

Also in Tinctura Cinchonæ Composita, ½ ounce to the pint.

## NATURAL ORDER.—SANTALACEÆ.

SANTALI LIGNUM. — The wood of *Santalum album*, from the East Indies. It is not much known in English commerce, but yields a light yellow thick essential oil of the sp. gr. ·963, which is employed as a perfume, and has lately been prescribed as a substitute for copaiba in gonorrhœa.

## NATURAL ORDER.—CUPULIFERÆ

## (*vel.* CORYLACEÆ).

**QUERCUS CORTEX, Oak Bark.**—The dried bark of small branches and young stems of *Quercus pedunculata*, collected in spring, from trees grown in Britain.

**Description.**—It is in channelled pieces, greyish and shining outside; cinnamon coloured inside; brittle, fibrous, and strongly astringent. The outer surface is dotted over with small scars, while the inner surface is longitudinally striated.

**Uses.**—An astringent in diarrhœa; the decoction makes a good gargle for sore throat and an efficient injection in *leucorrhœa*.

**Chemistry.**—Contains about 10 per cent. of a special variety of tannic acid, called *querci-tannic* acid, which precipitates gelatin, and the precipitate does not decompose so readily as that produced by ordinary tannic acid. It is distinguished from tannic acid by not being convertible into gallic acid. A decoction of oak-bark becomes dark purple on the addition of ferric chloride.

**Decoctum Quercus.**

| | | |
|---|---|---|
| Oak Bark, bruised .................... | | 1½ ounce |
| Distilled Water .................... | ad. | 20 fluid ounces |

Boil 10 minutes in a covered vessel; produce, 1 pint.

*Incompatibles*—Metallic salts; solution of isinglass; decoctum cinchonæ. Alkalies destroy its astringency.

**GALLÆ, Nut Galls.** — The excrescences caused by the punctures and the deposited ova of *Diplolepis Gallæ tinctoriæ*, found on the *Quercus infectoria*, chiefly from Asia Minor.

**Botanical Source.**—The female insect above named is furnished with a little, oblong organ, called an ovipositor, with which she pierces the tender shoots of the oak, and deposits an egg. The irritation thus caused in the plant produces a flow of juice to the spot and the gradual formation of an excrescence around the egg, called a gall, inside which the larva is hatched and undergoes its various transformations. At the end of about six months it becomes a winged insect, which bores its way to the surface of the gall and escapes. The best galls are those which are gathered before the insect obtains its freedom, and which are, therefore, not perforated.

**Description.** — Heavy, hard, rounded bodies of a bluish green colour, yellowish white within. The upper half of the gall is covered with small pointed nobs arranged irregularly and the lower half is smooth.

**Varieties.**—The finest are the Mosul galls, and the next variety Aleppo galls, imported from the Levant. Of these there are two varieties, the best being the blue galls without perforation, and the inferior the white galls, which are of a light greyish or yellowish hue, and are perforated. A third variety, called large Mecca galls, are imported from Bussorah. They are also round in shape and have a circle of horned protuberances at their centre. These latter are sometimes called Dead Sea apples.

**Chemistry.**—Galls contain from 30 to 40 per cent. of tannic acid, and about 3 per cent. of already formed gallic acid, with some extractive matter. An infusion of galls is acid to test paper, gives a dirty white precipitate with gelatin, and an inky black with ferric chloride.

### Tinctura Gallæ.

| | |
|---|---|
| Galls, in coarse powder ................ | 2½ ounces |
| Proof Spirit........................ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

Dose—½ to 2 drachms. (7 grains of Galls in 1 fluid drachm.)

### Unguentum Gallæ.

| | |
|---|---|
| Galls, in fine powder .................. | 80 grains |
| Benzoated Lard ...................... | 1 ounce |

### Unguentum Gallæ c. Opio.

| | |
|---|---|
| Ointment of Galls .................... | 1 ounce |
| Opium, in powder .................... | 32 grains |

**Substitutions.** — Chinese galls. From the *Rhus semialata* (*Anacardiaceæ*). They are light and hollow, and distorted by numerous protuberances, and completely covered by a thick velvety grey down.

2. English galls, smooth, brown, and slightly speckled pale brown excrescences formed on the ordinary English oak.

TANNIC ACID, $C_{27}H_{22}O_{17}$, is obtained by the following process:—Expose powdered galls to a damp atmosphere for two or three days, and afterwards add sufficient ether to form a soft paste. Let this stand in a well-closed vessel for 24 hours, and then, having quickly enveloped it in a linen cloth, submit it to strong pressure so as to separate the liquid portion. Reduce the pressed cake to powder, mix it with sufficient ether (to which 1-16th of its bulk of water has been added) to form a soft paste, and press this as before. Mix the expressed liquids, and expose the mixture to spontaneous evaporation until, by the aid, subsequently, of a little heat, it has acquired the consistency of a soft extract; then place it in earthen plates or dishes, and dry in a hot air chamber at a temperature not exceeding 212° F.

In this process the extraction of the tannic acid is accomplished by means of moist ether, because the tannic acid, although insoluble in pure ether, is very soluble in ether containing a little water, with which it forms a heavy yellow liquid, which has been supposed to be a definite chemical compound.

Tannic acid is soluble in water, and very soluble in glycerin and dilute alcohol. Its watery solution gives a precipitate with gelatin, ferric chloride, and with salts of lead and antimony. Exposed in contact with water, its solution becomes mouldy, and is converted into gallic acid and glucose. Heated to 620° F. it decomposes, forming *pyro-gallic* acid, $C_6H_6O_3$. A piece of raw hide immersed in a solution of tannic acid, completely absorbs the whole of it, forming leather, and leaving pure water. Dose, 2 to 10 grains.

### Glycerinum Acidi Tannici.

| | |
|---|---|
| Tannic Acid | 1 ounce |
| Glycerin | 4 fluid ounces |

Mix and dissolve with a gentle heat.

### Suppositoria Acidi Tannici.

| | |
|---|---|
| Tannic Acid | 36 grains |
| Benzoated Lard | 44 grains |
| White Wax | 10 grains |
| Oil of Theobroma | 90 grains |

3 grains of Tannic Acid in each. Divide into 15 grain suppositories, or into 12 equal parts.

### Suppositoria Acidi Tannici c. Sapone.

| | |
|---|---|
| Tannic Acid | 36 grains |
| Glycerin of Starch | 50 grains |
| Curd Soap | 100 grains |
| Starch | q.s. |

Divide like Suppositoria Acidi Tannici.

### Trochisci Acidi Tannici.

| | |
|---|---|
| Tannic Acid | 360 grains |
| Tincture of Tolu | ½ fluid ounce |
| Refined Sugar, in powder | 25 ounces |
| Gum Acacia, in powder | 1 ounce |
| Mucilage of Gum Acacia | 2 fluid ounces |
| Distilled Water | 1 fluid ounce |

Divide into 720 lozenges.

DOSE—1 to 6 (each lozenge contains ½ grain of Tannic Acid).

GALLIC ACID, $H_3C_7H_3O_5.H_2O$, is prepared by the following process :—Place 1 lb. of galls, in coarse powder, in a porcelain dish ; pour on as much water as will convert them into a thick paste, and keep them in this moistened condition for six weeks, at a temperature of between 60° and 70° F. ; adding water from time to time to substitute what is lost by evaporation. At the end of that time boil the paste for 20 minutes with 45 fluid ounces of water ; strain through calico, and, when the fluid is cold, collect on a filter the crystalline deposit which has formed, and let it drain. Press it strongly between the folds of filtering paper ; and re-dissolve it in 10 ounces of boiling distilled water. When the fluid is cooled to 80° F., pour it off from the crystals which are formed ; wash these with 3 ounces of ice cold water ; and dry them, first by filtering paper, and finally at a temperature not exceeding 100° F.

During the six weeks fermentation, the tannic acid of the galls is converted into gallic acid which is extracted by boiling water, and deposited on cooling.

Gallic acid is very slightly soluble in cold water and in ether, but freely soluble in boiling water and alcohol. Its solution gives no precipitate with gelatin, but it gives a bluish black precipitate with ferric chloride.

Heated to 410° F. it volatilises and becomes converted into pyro-gallic acid and $CO_2$. Its solutions in alkalies absorb oxygen, and become brown. It is very soluble in glycerin.

The dose is 2 to 10 grains as a hæmostatic.

**Glycerinum Acidi Gallici.**

| | |
|---|---|
| Gallic Acid | 1 ounce |
| Glycerin | 4 fluid ounces |

Mix and dissolve with a gentle heat.

## NATURAL ORDER.—ALTINGIACEÆ.

STYRAX PRÆPARATUS (B.P.), *Prepared storax.*—A balsam obtained from the bark of *Liquidambar orientale,** and purified by dissolving in rectified spirit, and straining.

**Botanical Source.**—The *L. orientale* is a tree growing in the south western parts of Asia Minor, and often attaining a height of 50 feet. It has palmate leaves very like those of the common plane tree.

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* According to Hanbury this plant belongs to the *Hamamelideæ*, Sub-class *Calycifloræ*, Sub-division *Epigynæ*.

**Collection.**—The inner bark is boiled in water and submitted to pressure in horse-hair bags, when the balsam exudes. It is then sent to Smyrna and exported *via* Trieste.

**Description.**—A brownish-yellow, semi-fluid resinous mass, semi-transparent and similar in consistence to thick honey. Heated to 212° F. it becomes more fluid, and boiled with a solution of potassium dichromate and sulphuric acid it evolves the odour of bitter almonds (by evolution of benzoic aldehyd).

**Uses.**—Storax agrees in medicinal properties with the other true balsams, and is given as a stimulant expectorant in chronic bronchitis.

**Chemistry.**—Contains styrol, styracin, cinnamic acid and resin. *Styrol* is a liquid hydrocarbon $C_8H_8$, having a sp. gr. of ·924, and boiling at 295° F., soluble in alcohol and ether. *Styracin* or *meta-cinnamein*, $C_{18}H_{16}O_2$, is polymeric with cinnamic aldehyd $C_9H_8O$. (See Oil of Cinnamon.) It is a crystalline solid, soluble in alcohol and ether, and convertible by the action of potassium hydrate into potassium cinnamate and cinnamic alcohol (*cinnyl hydrate* $C_9H_9HO$). These various substances may be separated by first distilling at 212° F. which separates styrol, then treating with hot water to remove the cinnamic acid, and finally dissolving out the styracin by ether.

Prepared Storax is an ingredient in Tinctura Benzoini Composita, 1½ ounce to 1 pint.

**Adulteration and Substitutions.**—1. The crude storax is much adulterated by sawdust, which is left behind in the alcohol preparation ordered by the B.P.

2. The liquid storax of Rosamala is a very fine article sometimes imported from the Eastern Archipelago, and is the produce of *Liquidambar Altingiana.*

## NATURAL ORDER.—SALICACEÆ.

**SALICIS CORTEX, Willow Bark.**—The bark of various species of willow, from British plants.

**Botanical Source.** — The *Salix fragilis*, *S. alba* and *S. caprea* are all diœcious trees, with the flowers achlamydeous and in catkins.

**Description.**—In thin quills, usually with a greenish brown epidermis and white inner surface, but varying much in appearance according to its age and source.

**Uses.**—Tonic and astringent, and to some extent anti-periodic; chiefly used for the manufacture of salicin.

**Chemistry.**—Contains much tannin, and a bitter principle called salicin.

**Salicin** $C_{13}H_{18}O_7$, is a crystalline glucoside soluble in cold water and alcohol, but not in ether. It is made by boiling an infusion of willow bark with freshly precipitated plumbic hydrate, which precipitates tannin and other matters, then filtering and crystallising the salicin. Boiled with diluted sulphuric acid it yields glucose and *saligenin* $C_7H_8O_2$, and the solution neutralised gives a fine blue with ferric chloride. Acted upon by potassium dichromate and sulphuric acid it yields *salicylol*, or *salicylous acid* $C_7H_6O_2$, which is oil of meadow-sweet.

**Salicylic Acid** $H_2C_7H_4O_3$, is closely allied to salicylol, and was formerly obtained from it, but is now made by heating carbolic acid (*phenyl hydrate* $C_6H_5HO$)

with potassium hydrate, and then passing through carbonic anhydride between 212° and 482° F., which produces *inter alia* potassium salicylate. This salt is then made into a saturated solution and acidulated with hydrochloric acid, when the salicylic acid crystallises out.

It is only slightly soluble in cold but readily in boiling water. Its solution gives a deep purple with ferric salts. It has been much used lately in the treatment of rheumatism.

## DIVISION II.—GYMNOSPERMIA.

Plants having their ovules naked and impregnated by the direct action of the pollen.

## NATURAL ORDER.—CONIFERÆ.

**LARICIS CORTEX, Larch Bark.**—The dried bark, deprived of its outer layer, of *Larix Europœa*, a native of Central Europe, cultivated in Britain.

**Description.**—In flattish pieces or large quills, reddish brown externally; and smooth and pinkish brown or pale yellow, internally. It breaks with a short fracture and smells distinctly of turpentine.

**Uses.**—Hæmostatic and astringent.

**Chemistry.**—Larch Bark contains a peculiar variety of tannic acid, which gives olive-green precipitates with ferric salts. It also yields a crystalline substance called *larixin* $C_{10}H_{10}O_5$, which may be obtained by evaporating an infusion of the bark to a syrupy consistence; distilling and crystallising the distillate.

It is slightly soluble in cold water, but freely in boiling water and alcohol. It is sparingly soluble in ether. Its aqueous solutions have a feeble acid re-action, and give a purple colour with ferric chloride and a gelatinous precipitate with baryta water.

**Tinctura Laricis.**

| | |
|---|---|
| Larch Bark, in coarse powder .......... | 2½ ounces |
| Rectified Spirit ....................ad. | 20 fluid ounces |

Macerate in 15 ounces of Spirit for 48 hours, then percolate with the remaining Spirit. Afterwards press the marc, mix the products, filter, and add Spirit to 1 pint.

**Dose**—20 to 30 minims.

**TEREBINTHINA VENETA, Venice Turpentine.** — The oleo-resin obtained by incision from *Larix Europæa*, imported from Italy, Switzerland, and the Tyrol.

**Chemistry.**—It yields about 15 per cent. of volatile oil and the rest resin. The true Venetian turpentine is rarely imported into this country, the article sold as Venice turpentine being a mixture of ordinary resin and oil of turpentine, which may be readily distinguished from the true article by the facility with which it dries up when spread on paper.

**JUNIPERI FRUCTUS.** — The fruit of *Juniperus communis*, from Northern Europe, and cultivated in England.

**Botanical Source.**—The *J. communis* is a diœcious shrub with dark green, subulate leaves in whorls of three. The fruit is a purple black galbulus, covered with greenish bloom and consisting of three fleshy bracts enclosing as many seeds.

**Chemistry.**—The active principle is a volatile oil.

**JUNIPERI OLEUM.**—The oil distilled in Britain from the unripe fruit of the plant above described.

**Description.**—Juniper oil is colourless, or light greenish. Sp. gr. ·83. Its formula is $C_{10}H_{16}$. It is, therefore, isomeric with oil of turpentine, and about equally soluble in alcohol.

**Spiritus Juniperi.**

| | |
|---|---|
| Oil of Juniper | 1 fluid ounce |
| Rectified Spirit | 49 fluid ounces |

(9½ minims of Ol. Junip. in 1 fluid ounce.)

Dose—½ drachm to 1 drachm. (1-5th of the strength of 1864).

**Uses.**—Stimulant and diuretic, in doses of 4 to 6 minims, usually prescribed with sweet spirit of nitre. It is also used in the manufacture of gin.

**JUNIPERI OLEUM EMPYREUMATICUM.** — *Juniperus Oxycedrus* yields Huile de Cade, or Juniper tar, by destructive distillation.

**SABINÆ CACUMINA, Savin.** — The fresh and dried tops of *Juniperus Sabina*, collected in spring, from plants cultivated in Britain.

**Botanical Source.**—The *J. Sabina* is a small, bushy shrub, with minute, ovate, convex, imbricated and appressed leaves in whorls of four. The fruit is a bluish galbulus, about the size of a currant.

**SABINÆ OLEUM, Oil of Savin.**—The oil distilled in Britain from the fresh plant, which yields about 3 per cent. It is colourless, or pale yellow; sp. gr. ·915, moderately soluble in spirit and freely soluble in ether. It is isomeric with turpentine $C_{10}H_{16}$.

**Uses.**—An emmenagogue, and frequently used to procure abortion, but usually with fatal effects, being a powerful irritant poison.

The dose in powder is 4 to 10 grains, and of the oil 1 to 5 minims.

**Tinctura Sabinæ.**

| | |
|---|---|
| Savin Tops, dried and coarsely powdered | 2½ ounces |
| Proof Spirit........................ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

Dose—20 minims to 1 drachm. (1 grain of Savin in 9 minims.)

*Antidotes*—Emetics; afterwards opiates and demulcents.

**Unguentum Sabinæ.**

| | |
|---|---|
| Fresh Savin Tops, bruised ............ | 8 ounces |
| Yellow Wax .......................... | 3 ounces |
| Prepared Lard........................ | 16 ounces |

Digest 20 minutes, and strain through calico.

**AMERICAN TURPENTINE, Horse Turpentine.**—The produce chiefly of *Pinus palustris* and also of *P. tæda* and *P. pinaster*, imported from America.

**Collection.**—It is obtained by cutting a hollow in the trunk of the tree, and collecting the juice which exudes, transferring it to casks.

**Description.**—A yellowish white semi-solid substance resembling honey, with a strong odour of turpentine.

**Chemistry.**—Contains about 15 per cent. of a volatile oil and 85 per cent. of resin.

**TEREBINTHINÆ OLEUM.**—The oil distilled from the oleo-resin described above as American turpentine.

**Preparation.**—When the crude oleo-resin is distilled with water in a copper still, the volatile oil distils over, and the resin remains in the retort.

**Chemistry.**—The volatile oil of turpentine is a limpid, colourless, and inflammable liquid, having the formula $C_{10}H_{16}$, and a sp. gr. ·864. It is very slightly soluble in water, more so in rectified spirit, and miscible in all proportions with ether, absolute alcohol, and benzol. It has the power of dissolving volatile and fixed oils, resins, caoutchouc, sulphur, and phosphorus. When exposed to the air it gradually absorbs oxygen and becomes converted into resin. When treated with hydrochloric acid it forms two crystalline compounds, $C_{10}H_{16}.HCl$ and $C_{10}H_{16}2HCl$, which are known as artificial camphors. Treated with strong nitric acid it inflames and is converted into a variety of substances.

Dose, as a diuretic and hæmostatic, 5 to 20 minims; as an anthelmintic, from 2 to 4 fluid drachms.

### Confectio Terebinthinæ.

| | |
|---|---|
| Oil of Turpentine | 1 fluid ounce |
| Liquorice Powder | 1 ounce |
| Clarified Honey | 2 ounces |

Dose—1 to 2 drachms. (15 minims of Turpentine in 1 drachm.)

**Enema Terebinthinæ.**

| | |
|---|---|
| Oil of Turpentine | 1 fluid ounce |
| Mucilage of Starch | 15 fluid ounces |

Mix for 1 Enema.

**Linimentum Terebinthinæ.**

| | |
|---|---|
| Oil of Turpentine | 8 fluid ounces |
| Soft Soap | 1 ounce |
| Camphor | ½ ounce |

**Linimentum Terebinthinæ Aceticum.**

| | |
|---|---|
| Oil of Turpentine | 1 fluid ounce |
| Acetic Acid | 1 fluid ounce |
| Liniment of Camphor | 1 fluid ounce |

**Unguentum Terebinthinæ.**

| | |
|---|---|
| Oil of Turpentine | 1 fluid ounce |
| Resin, in coarse powder | 60 grains |
| Yellow Wax | ½ ounce |
| Prepared Lard | ½ ounce |

**CREASOTUM, Creasote** (*κρέας* flesh, *σώζω* I preserve).—A product of the distillation of wood tar.

**Description.**—A colourless or slightly yellow liquid, with a strong empyreumatic odour. Its name is derived from its antiseptic power of preserving flesh. Unlike phenyl hydrate, it is insoluble in commercial glycerin, nor does it cause any effect when added to the solution known as collodium B.P.

**Uses.**—Creasote is a popular remedy for toothache, and employed by dentists in dressing carious teeth. It is frequently prescribed in order to allay sickness in doses of ½ to 3 minims; also in phthisis and chronic bronchitis, especially where there is a tendency to hæmorrhage.

**Chemistry.**—Consists chiefly of *creasol*, $C_8H_{10}O_2$, which forms an almost insoluble crystalline salt with ammonium hydrate. Like carbolic acid, it coagulates albumen. Sparingly soluble in water, freely soluble in alcohol, ether, and glacial acetic acid. Sp. gr. 1·071. It is dextro-rotatory, and is not solidified by the cold produced by a mixture of hydrochloric acid and sodium sulphate. It is insoluble in glycerin.

**Mistura Creasoti.**

| | |
|---|---|
| Creasote | 16 minims |
| Glacial Acetic Acid | 16 minims |
| Spirit of Juniper | ½ fluid drachm |
| Syrup | 1 fluid ounce |
| Distilled Water | 15 fluid ounces |

DOSE—½ to 1 ounce.

**Unguentum Creasoti.**

| | |
|---|---|
| Creasote | 1 fluid drachm |
| Simple Ointment | 1 ounce |

**Vapor Creasoti.**

| | |
|---|---|
| Creasote | 12 minims |
| Boiling Water | 8 fluid ounces |

**SANDARACH.**—A white brittle resin, the produce of *Callitris quadrivalvis*, imported from Mogadore. It is not used in medicine, but its powder is known under the name of POUNCE.

**RESINA** (B.P.), **Resin**, or *Rosin.*—*Rosin colophony*, the residue left after the distillation of the oil of turpentine.

**Description.**— Translucent, amber coloured, and brittle, with a shining fracture, easily reduced to a white powder, fusible by heat, and burning with a dense, yellow, smoky flame.

**Uses.**—Slightly stimulant, but chiefly employed in pharmacy for its adhesive qualities.

**Chemistry.**—Pure resin has a sp. gr. of 1·07, and consists chiefly of a crystallisable acid called abietic or sylvic acid, and a non-crystallisable resin known as pinic acid, both isomeric, and having the formula $C_{20}H_{30}O_2$. These acids may be separated by fractional solution in cold spirit of wine, the latter being the more soluble. When acted upon by alkalies, resin combines with them, forming resin soap, which is a constituent of the ordinary yellow kitchen soap. In this decomposition the acids of resin give up one atom of hydrogen in exchange for the alkaline base.

**Specially Distinctive Tests.**—Common resin and all coniferous products containing it, except Canada balsam, are—1. Completely soluble in chloroform, soluble in ether, and the latter solution is not rendered turbid by alcohol.

2. Soluble in alcohol, and the solution is coloured greenish brown by alcoholic ferric chloride (1 in 10), and precipitated by saturated alcoholic plumbic acetate, not soluble on boiling.

3. Acted upon by a saturated solution of sodium carbonate.

4. Extracted by petroleum spirit and the solution evaporated, a residue is obtained which is coloured reddish violet with blue streaks by impure chloral hydrate.

### Emplastrum Resinæ.

| | |
|---|---|
| Resin | 4 ounces |
| Lead Plaster | 32 ounces |
| Hard Soap | 2 ounces |

### Unguentum Resinæ.

| | |
|---|---|
| Resin, in coarse powder | 8 ounces |
| Yellow Wax | 4 ounces |
| Simple Ointment | 16 ounces |

Resin is also contained in Charta Epispastica, Emplastrum Cantharidis, Emplastrum Hydrargyri, Emplastrum Picis, Emplastrum Saponis and Unguentum Terebinthinæ.

Resin plaster is an ingredient in Emplastrum Belladonnæ, Emplastrum Opii, Emplastrum Calefaciens, and Emplastrum Plumbi Iodidi.

**THUS AMERICANUM, Common Frankincense.**—A concrete acrid turpentine obtained by spontaneous exudation from the *Pinus tæda* and *P. palustris*, from the Southern States of North America.

**Description.**—It is a softish, bright yellow, opaque solid, having the odour of turpentine.

**Chemistry.**—Thus Americanum is a mixture of essential oil of turpentine and resin, and enters into the composition of Emplastrum Picis.

**TEREBINTHINA CANADENSIS, Canada Balsam.**—An oleo-resin, obtained by incision in the stem of *Abies balsamea*, from Canada.

**Description.**—A pale yellow oleo-resin, perfectly transparent and of the consistence of very thin honey.

When mixed with 1-6th of its weight of magnesia it solidifies, and it also dries up spontaneously on exposure to the air. It contains about 18 per cent. of volatile oil and 82 per cent. of resin.

**Uses.**—The medicinal properties of Canada Balsam are similar to turpentine, but more mild. Dose 20 to 30 grains. It is chiefly used for mounting microscopic objects.

A constituent of *Charta Epispastica* and *Collodium Flexile.*

**Specially Distinctive Tests.**—This substance is—

1. Completely soluble in chloroform, and gives a perfect solution in ether, which becomes turbid on the addition of alcohol.

2. An alcoholic solution, becomes turbid with an alcoholic solution of ferric chloride (1 in 10), but clears up on boiling.

3. The extract from the alcoholic solution is coloured violet by impure chloral hydrate containing alcoholate.

**PIX BURGUNDICA, Burgundy Pitch.** — Stated in the B.P. to be the resinous exudation from the stem of *Abies excelsa,* imported from Switzerland.

**Collection.**—The crude oleo-resin, which flows from the tree, is melted in hot water; strained through a cloth and cast into moulds. Although officially stated to be imported from Switzerland, it is really principally produced in the Black Forest, Austria and Finland.

**Description.**—Burgundy pitch should be of a dull reddish brown colour, hard and brittle, free from air vesicles, and giving off no water when heated. It should be soluble in rectified spirit and glacial acetic acid.

**Chemistry.**—Burgundy Pitch consists chiefly of resin, with a little volatile oil of turpentine, which escapes dissipation during the melting.

**Emplastrum Picis.**

| | |
|---|---|
| Burgundy Pitch | 26 ounces |
| Frankincense | 13 ounces |
| Resin | 4½ ounces |
| Expressed Oil of Nutmeg | 1 ounce |
| Yellow Wax | 4½ ounces |
| Olive Oil | 2 fluid ounces |
| Water | 2 fluid ounces |

**Emplastrum Ferri.**

| | |
|---|---|
| Hydrated Peroxide of Iron, in fine powder | 1 ounce |
| Burgundy Pitch | 2 ounces |
| Lead Plaster | 8 ounces |

**Substitutions.**—False Burgundy pitch is made by mixing American turpentine with palm oil and resin

**PIX LIQUIDA, Wood Tar.**—Obtained by the destructive distillation of the wood of *Pinus sylvestris*, from Finland, Northern Russia and Sweden.

**Uses.**—A common remedy in cutaneous diseases.

**Chemistry.**—The distillate from wood consists of two portions: the lighter aqueous portion which contains impure acetic acid, wood spirit, acetone and creasote, and is separated for the manufacture of these substances; and the heavier portion, which is the true official tar, and is a mixture, affording, amongst other products, *toluene* $C_7H_8$; *napthalene* $C_{10}H_8$; and *anthracene* $C_{14}H_{10}$.

**Unguentum Picis Liquidæ.**

| | |
|---|---|
| Tar | 5 ounces |
| Yellow Wax | 2 ounces |

**PIX NIGRA.**—The residuum in the still after the distillation of tar. Not official.

# CLASS II.—MONOCOTYLEDONES.

Having the seed monocotyledonous; germination endorhizal; root fibrous; stem endogenous; leaves usually with parallel venation, and parts of the flowers in multiples of 3.

## SUB-CLASS I.—DICTYOGENÆ.

Having the leaves with reticulated venation; the underground stem and root with concentric rings; and the floral envelopes verticillate.

### NATURAL ORDER.—SMILACEÆ.

**SARSÆ RADIX, Jamaica Sarsaparilla.**—The dried root of *Smilax officinalis*, a native of Central America, and imported from Jamaica.

**Botanical Source.**—The various species of ***Smilax*** which yield sarsaparilla are evergreen twining shrubs, with unisexual and diœcious flowers.

**Description.**—Roots about as thick as a goose quill, reddish brown externally, folded in bunches about 18 inches long, and covered with small rootlets, which are known technically as "the beard." A section of good sarsaparilla should show a thick meditullium and only a very slight deposit of starch in the inner cortical layer. A drop of sulphuric acid should colour the whole section dark purple, and a cool decoction should not become blue with tincture of iodine.

**Uses.**—Alterative. Used in secondary syphilis, and all diseases dependent on a depraved state of the system.

**Chemistry.**—The active principles are a very minute quantity of volatile oil and a white crystallisable body called *smilacin* or *parillin*. Parillin is prepared by exhausting the root with heated rectified spirit, and then evaporating until the remaining fluid weighs only 1-6th of the amount of the root started with. This liquid is then gradually diluted with 1¼ times its volume of water, which causes the separation of crude parillin.

This deposit, after settling, is then treated with ¼ its volume of alcohol, filtered, and again precipitated with water, and the precipitate washed with dilute spirit not containing more than 25 per cent. of alcohol, in which it is insoluble. It may lastly be again dissolved in rectified spirit, agitated with animal charcoal and crystallised. Thus prepared, parillin is obtained in pure white thin scales or prisms, only soluble in 10,000 parts of cold water, but more freely in boiling water. Its best solvent is rectified spirit, but it also forms a solution with chloroform which cannot be filtered.

**Specially Characteristic Tests.**—1. With strong sulphuric acid parillin gives a pure yellow solution becoming cherry-red at the edges.

2. Heated on a water bath with diluted sulphuric acid (10 per cent.), it becomes first greenish, then red, and finally brown.

3. A solution of parillin in chloroform treated with dry hydrochloric acid gas suddenly becomes brown by transmitted light, and full green by reflected light.

4. A similar green fluorescence is observed when it is dissolved in any dilute mineral acid, but too much water causes it to disappear.

### Decoctum Sarsæ.

| | |
|---|---|
| Jamaica Sarsaparilla, cut transversely .. | 2½ ounces |
| Boiling Distilled Water................ | 1½ pint |

Digest 1 hour, boil 10 minutes in a covered vessel; product 1 pint.

*Incompatibles*—Alkalies; lime water; plumbi acetas; some salts of mercury, and other metals.

Dose—2 to 10 ounces.

### Decoctum Sarsæ Compositum.

| | |
|---|---|
| Jamaica Sarsaparilla, cut transversely .. | 2½ ounces |
| Sassafras, in chips .................... | ¼ ounce |
| Guaiacum Wood Turnings ............ | ¼ ounce |
| Fresh Liquorice Root, bruised .......... | ¼ ounce |
| Mezereon Bark ...................... | 60 grains |
| Boiling Distilled Water................ | 1½ pint |

Digest 1 hour, boil 10 minutes in a covered vessel, product, 1 pint.

Dose—2 to 10 ounces.

### Extractum Sarsæ Liquidum.

| | |
|---|---|
| Jamaica Sarsaparilla, cut transversely .. | 16 ounces |
| Distilled Water at 160°................ | 14 pints |
| Rectified Spirit ...................... | 1 fluid ounce |

Product 8 ounces; sp. gr. 1·095. 100 lbs. of Root yield from 25 to 30 lbs. of solid extract. The cortical part will yield one half.

Dose—2 to 4 drachms. 1 fluid ounce is equal to 2 ounces of Root.

**Other Varieties of Sarsaparilla.**—The various sarsaparillas of commerce are divided into two classes—1. "Mealy," or "gouty," which contain much starch. 2. "Lean," or non-mealy, having very little starch, and consequently more valuable for extract.

I. *Mealy Sarsaparillas.*

1. *Honduras*, in rolls 30 inches long, and closely wound round with a long root so as to form a neat bundle.

2. *Guatemala*, in similar bundles to the Honduras, but of a more decidedly orange tint. The rootlets become thicker as they descend, and the bark inclines to peel off. It is supposed to be the produce of *S. papyracea.*

3. *Brazilian.* Not much imported, but when seen it is in bundles over 3 feet in length and 6 inches in diameter, tightly compressed, and neatly cut at the ends. These bundles are wound round by the stem of a plant not a smilax. Brazilian is supposed also to be chiefly *S. papyracea.*

II. *Non-Mealy Sarsaparillas.*

1. The official sarsa, *S. officinalis*, already described.

2. *Mexican.* Supposed to be produced by *S. medica*,

and not in bundles, with portions of the rhizome and stem attached. The stem portions are angular and thorny.

3. *Guayaquil.* Similar to Mexican, but the portions of the stem are round and not thorny, and the root has many rootlets attached.

## SUB-CLASS II.—PETALOIDEÆ.

Endogenous herbs with parallel veined leaves, and flowers in white or coloured perianths.

## SUB-DIVISION I.—EPIGYNÆ.

With superior perianths and inferior ovaries.

## NATURAL ORDER.—ORCHIDACEÆ.

Usually herbs terrestrial or epiphytical; leaves entire and sheathing; perianth irregular and superior, with the large outer leaf (*labellum*) often assuming curious shapes; stamens gynandrous, with the pollen grains collected into masses (*pollinia*); ovary inferior 1-celled, with 3 parietal placentæ.

**VANILLA.**—The dried pods of *Vanilla planifolia* indigenous to Eastern Mexico.

Also the dried pods of *V. aromatica.*

**Botanical Source.**—A tree growing in damp situations, and producing a long fleshy fruit.

**Description.** — In long dry pods, 3 to 8 inches long and 3-10ths to 4-10ths of an inch wide, growing narrower and hooked at the stalk end. The surface is striated longitudinally, and is shining, unctuous, and often covered with an efflorescence of minute crystals.

**Chemistry.**—It owes its flavour to a substance called **Vanillin**, which crystallises in prisms, and is soluble in alcohol, ether, and oils, but less so in water. The flavour of vanillin is diffusible to a remarkable extent in sugar. It is slightly acid to test paper, and its formula is $C_{16}H_8O_6$. Vanillin has been lately obtained artificially by oxidising *coniferin*, $C_{16}H_{22}O_8.2H_2O$, a body existing in the sap of pines, with potassium dichromate and sulphuric acid.

**Salep.**—The root of several indigenous and other species, chiefly *Orchis mascula.* When dried it forms an amylaceous product which was formerly esteemed.

## NATURAL ORDER.—ZINGIBERACEÆ.

**GRANA PARADISI, Grains of Paradise.**—The seeds of *Amomum Melegueta*, from the West Coast of Africa.

**Description.**—Hard seeds, about 1-10th of an inch in diameter, with a shining reddish-brown surface and variable angular form.

**Uses.**—In veterinary medicines.

**Chemistry.**—The chief principle is an essential oil.

**CURCUMÆ RHIZOMA, Turmeric.**—The dried rhizome of *Curcuma longa*. A native of Southern Asia, and imported from India and the Eastern Archipelago.

**Description.**—The most common is the long turmeric, about the size of the finger; pointed; and externally of a yellow colour, and marked with transverse annular wrinkles, but it is often found as short turmeric, which is ovate or pear-shaped, much thicker and shorter.

**Uses.**—As an ingredient in condiments, specially in curry; in dyeing; and in testing for alkalies and boracic acid.

**Chemistry.**—Turmeric contains about 1 per cent. of volatile oil and a colouring matter called *curcumin*, obtained by exhausting the root with benzol, after the essential oil has been distilled off. Its formula is supposed to be $C_{10}H_{10}O_{18}$. Its yellow colour becomes red in the presence of alkalies, and orange, after drying, in the presence of boracic acid.

**Tincture of Turmeric.**

| | |
|---|---|
| Turmeric, bruised | 1 ounce |
| Rectified Spirit | 6 fluid ounces |

Macerate 7 days.

**Turmeric Paper (B.P.)**

Unsized paper dipped in the above tincture and dried.

**CARDAMOMUM, Cardamom.**—The dried capsules containing the seeds of *Elettaria Cardamomum*, cultivated in Malabar.

**Description.**—The capsules are imported entire, as the seeds, which are the real part required, would lose much of their activity if separated before being required for use. Good cardamomum fruits should be plump and heavy, and should yield seeds to the extent of 3-4ths of their weight. The separated seeds are reddish brown, wrinkled and angular externally, and whitish internally.

**Uses.**—Similar to ginger, but more aromatic.

**Chemistry.** — The seeds contain 4 per cent. of volatile oil, 10 per cent. of fixed oil and acrid resin. The taste and odour are due to the volatile oil, which has a sp. gr. of ·93 and contains the usual elœopten and stearopten.

**Tinctura Cardamomi Composita.**

| | |
|---|---|
| Cardamom Seeds, freed from the Pericarps, and bruised ................ | ¼ ounce |
| Carraway Fruit, bruised................ | ¼ ounce |
| Raisins, freed from their seeds .......... | 2 ounces |
| Cinnamon Bark, bruised .............. | ½ ounce |
| Cochineal, in powder .................. | 60 grains |
| Proof Spirit ........................ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

DOSE—½ to 2 drachms.

Also an ingredient in **Extractum Colocynthidis Compositum**; Pulvis Cinnamomi Compositus (1 in 3);

Pulvis Cretæ Aromaticus (1 in 44); Tinctura Gentianæ Composita; Tinctura Rhei; and Vinum Aloes.

**Varieties.**—There are three varieties of cardamoms: the best are Malabar shorts. The second are the Madras shortlongs, lighter in colour, and shipped at Madras. The third variety are Aleppy shorts, with a peculiar greenish tint, imported from Calicut. As a rule, shorts are always to be preferred.

Further information respecting cardamoms must be sought for in treatises devoted to the subject. The natural history of this class of fruits has always proved a difficulty to pharmacologists.

**ZINGIBER, Ginger.**—The scraped and dried rhizome of *Zingiber officinale*, from plants cultivated in the East and West Indies and tropical regions of Asia, Africa, and America.

**Description.**—In more or less brownish zigzag pieces called "hands" or "races." Good official races should be scraped, and have a yellowish white but not a chalky appearance on the surface, with a short mealy fracture.

**Uses.**—Aromatic stimulant and carminative; good in flatulence and to allay the griping of purgatives; when chewed, ginger behaves as a sialagogue.

Dose, 5 to 30 grains.

**Chemistry.**—According to the older writers, the active principle of ginger is the volatile oil, $C_5H_8$; but Flückiger states that he obtained, by distilling ginger with water, a yellow oil having the sp. gr. ·878, and possessing the odour but *not* the pungent taste of ginger. He is of opinion that the acridity of ginger is due to the resin it contains, not yet, however, properly investigated.

**Syrupus Zingiberis.**

| | |
|---|---|
| Strong Tincture of Ginger.............. | 6 fluid drachms |
| Syrup.................................. | 19 fluid ounces |

Dose—1 drachm.

**Tinctura Zingiberis.**

| | |
|---|---|
| Ginger Root, in coarse powder.......... | 2½ ounces |
| Rectified Spirit ....................ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

Dose—15 minims to 1 drachm. (7 grains of Ginger in 1 fluid drachm.)

**Tinctura Zingiberis Fortior.**

| | |
|---|---|
| Ginger, in fine powder | 10 ounces |
| Rectified Spirit ... ad. | 20 fluid ounces |

Pack the Ginger tightly in a percolator, and pour carefully over it ¼ pint of spirit. In 2 hours add more, until 1 pint has passed through.

Dose—5 to 20 minims. (28 grains of Ginger in 1 fluid drachm.)

Also contained in Confectio Opii, Confectio Scammonii, Infusum Sennæ, Pilula Scillæ Composita, Pulvis Cinnamomi Compositus, Pulvis Jalapæ Compositus, Pulvis Opii Compositus, Pulvis Rhei Compositus, Pulvis Scammonii Compositus, Syrupus Rhamni, and Vinum Aloes.

**Varieties.**—There are four chief varieties of ginger at present found in the market. These are Jamaica, Cochin, Bengal, and African; the Jamaica being the best, Cochin second, and Bengal third of the scraped gingers, while the African is unscraped.

**GALANGAL** (*Radix Galangæ minoris*) is derived from *Alpinia officinarum*. The drug is an aromatic stimulant, and might take the place of ginger. Its chief consumption is in Russia.

## NATURAL ORDER.—MARANTACEÆ.

**MARANTÆ AMYLUM, Arrowroot.**—The starch from the tubers of *Maranta arundinacea*, from the West Indies.

**Collection.**—The tubers (rhizomes) are beaten into a pulp, when one year old, and thrown into water and agitated, and rapidly strained. The starch passes through with the water, and is allowed to dry in the sun. Besides the West Indian arrowroot, East Indian arrowroot is known in commerce, and is usually yielded by *Curcuma augustifolia.*

Maranta arrowroot is of three qualities: namely, Bermuda, St. Vincent and Natal. The first importation of Natal arrowroot was of unexceptionable quality, but less care was bestowed on its subsequent preparation.

**Tous les Mois.** — The starch of *Canna edulis*, produced in Barbadoes in a similar manner to arrowroot. It is an exceedingly pure starch, and an article of great consumption.

*Canna speciosa* is said to produce African turmeric.

## NATURAL ORDER.—IRIDACEÆ.

Herbs with bulbs, corms or rhizomes; leaves equitant; perianth 6 parted and superior; stamens 3 on the outer segments of the perianth, and with extrorse anthers; ovary inferior 3-celled, with axile placentation, and a 3-lobed and often petaloid stigma.

**CROCUS, Saffron.**—The dried stigma and part of the style of *Crocus sativus*, imported from Spain, France and Italy.

**Botanical Source.** — An annual, very like the ordinary crocus of our gardens; with a pale, purple perianth, and a specially large, somewhat petaloid stigma.

**Description.**—A mass of deep red, shrub-like styles, each terminated by 3 long orange brown stigmas, expanded towards their ends. Rubbed on damp paper it leaves an orange colour, but pressed between folds of filtering paper it leaves no oily stain.

**Chemistry.**—The colouring matter of saffron is supposed to be a substance called polychroite, which is a viscid, deliquescent body; readily soluble in water, but sparingly soluble in alcohol, and insoluble in ether. It is a glucoside, and by the action of a dilute acid is decomposed into *crocin*, an essential oil and glucose. The red colour of saffron is changed to blue, violet, and brown by strong sulphuric, and to green, yellow and brown by strong nitric acid.*

**Tinctura Croci.**

| | |
|---|---|
| Saffron ................................ | 1 ounce |
| Proof Spirit ........................ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

Saffron is also contained in Decoctum Aloes Compositum; Pilula Aloes et Myrrhæ; Pulvis Cretæ Aromaticus; Tinctura Cinchonæ Composita; Tinctura Opii Ammoniata; and Tinctura Rhei.

**Varieties.**—The best is the hay saffron, and the inferior is the cake saffron, which is much adulterated by the florets of safflower, *Carthamus tinctorius*, which are easily recognisable after steeping in warm water.

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* A very dilute infusion of saffron is decolorised by diluted hydrochloric acid. Subsequently boiled in the presence of sugar, the yellow tint will be restored and a beautiful red fluorescence make its appearance on the surface of the liquid.—(*Stoddart.*)

The expanded stigma of the saffron-crocus exhibits a characteristic and unmistakable form.

**Adulterations.**—The hay saffron is frequently made heavy by dipping it in coloured chalk, which may be detected by stirring with a very small quantity of water.[*] It has also been said to be mixed with dried shreds of beef and the dried stamens of the plant. Saffron is also found which has been exhausted of a portion of its colouring matter. This can be discovered by steeping in water and observing the amount of colour.

## SUB-DIVISION II.—HYPOGYNÆ.

Having the perianth inferior and the ovary superior.

## NATURAL ORDER.—LILIACEÆ.

Herbs, shrubs or trees with sessile or sheathing leaves; perianth 6 partite and inferior; stamens 6; anthers introrse; ovary, superior 3-celled with axile placentæ; fruit with loculicidal dehiscence or succulent.

---

[*] A white powder will instantly separate, causing the water to appear turbid; and if a drop of hydrochloric acid be now added, a brisk effervescence will take place.—(*Hanbury.*)

**ALOE BARBADENSIS, Barbadoes Aloes.** — The inspissated juice of the leaves of *Aloe vulgaris.*

**Botanical Source.**—The *A. vulgaris* is a succulent plant, with lanceolate and curved leaves, having large reddish spines and bright yellow flowers. Aloes are cultivated in Barbadoes, being planted in rows, carefully attended to, and manured.

**Collection.**—The leaves are cut off close to the plant in March or April, during the heat of the day, and instantly thrown into a trough, where the juice is allowed to exude spontaneously. The juice is then exposed to the sun until sufficiently inspissated, or it may be rapidly boiled down in copper vessels.

**Description.**—Good samples of Barbadoes aloes should be hard, dry, and have a deep chocolate-brown colour, with a clean, dull, conchoidal fracture. When breathed upon, it exhales a characteristic odour. It is usually imported in gourds.

**Uses.**—In full doses cathartic, especially on the large intestines. It is slow in operation and useful as a purgative for women, being to some extent a stimulant of the action of the uterus, but it must not be given when the patient suffers from hæmorrhoids. Used in the form of enema it is very efficient as an anthelmintic in thread worms (*ascaris vermicularis*). A point in the administration of aloes, is, that if 1 to 2 grains does not act, a better effect cannot be produced by increasing the dose.

**Chemistry.**—The purgative constituent is supposed to be *aloin* $C_{34}H_{36}O_{14}.H_2O$, which is accompanied by a little amorphous aloin, volatile oil and resin. Aloin is prepared by boiling 1 lb. of aloes with 1 gallon of water slightly acidulated with sulphuric acid. The solution thus obtained, having been allowed to stand for 24 hours, is poured off from the fixed resinous matter, and quickly concentrated by evaporation to about 30 ounces, and set to crystallise. The crystals of aloin thus obtained are purified by re-crystallisation from very dilute spirit.

Each of the commercial varieties of aloes seems to contain a peculiar aloin of its own. Thus barbaloin is in prismatic crystals, soluble in water, alcohol and ether, and turns red when treated with nitric acid, the colour rapidly fading, It melts at 300° F., and when subjected to oxidation with nitric acid it yields both picric and chrysamic acids. When mixed with a drop of sulphuric acid, and then a rod moistened with nitric acid placed in contact, no blue colour is developed.

*Socaloin*, obtained from Socotrine aloes, $C_{30}H_{32}O_{14}$, is much less soluble in ether than *barbaloin*, and does not give a brilliant red with nitric acid.

*Nataloin*, $C_{25}H_{28}O_{11}$, crystallises in plates, but is only slightly soluble in water and alcohol. With nitric acid it produces a strong red colour which does not fade like that from barbaloin, and when treated with a drop of sulphuric and then nitric acid it yields picric and oxalic acids, but not chrysamic acid.

### Enema Aloes.

| | |
|---|---|
| Aloes | 40 grains |
| Carbonate of Potash | 15 grains |
| Mucilage of Starch | 10 fluid ounces |

Mix and rub together.

### Extractum Aloes Barbadensis.

Barbadoes aloes purified by solution in water, straining, and subsequent evaporation.

(100 parts yield 75 parts of extract.)

Dose—2 to 6 grains.

**Pilula Aloes Barbadensis.**

| | |
|---|---|
| Barbadoes Aloes, in powder ............ | 2 ounces |
| Hard Soap, in powder ................ | 1 ounce |
| Oil of Carraway ...................... | 1 fluid drachm |
| Confection of Roses .................. | 1 ounce |

Dose—5 to 10 grains. (50 per cent. stronger than P.L.)

**Pilula Aloes et Ferri.**

| | |
|---|---|
| Sulphate of Iron ........................ | 1½ ounce |
| Barbadoes Aloes, in powder ............ | 2 ounces |
| Compound Powder of Cinnamon........ | 3 ounces |
| Confection of Roses .................. | 4 ounces |

Dose—5 to 10 grains. (1½ grains of Iron and 4 grains of Aloes in 10½ grains.)

Also contained in Pilula Cambogiæ Composita (1 in 6); Pilula Colocynthidis Composita (1 in 3); Pilula Colocynthidis et Hyoscyami (1 in 4½).

**ALOE SOCOTRINA, Socotrine Aloes.**—The inspissated juice of the leaf of *Aloe Socotrina* and allied species imported from Bombay, to which it has been carried from Socotra to Zanzibar.

**Description.**—It is imported in kegs in tin-lined boxes. When of a fine quality it is a dark reddish brown, and when breathed upon it emits a peculiar odour. Very frequently it is opaque and liver-brown in colour, with a dull waxy fracture and not very fragrant, when it receives the name of "hepatic aloes."

**Uses.**—Similar to Barbadoes aloes.

**Decoctum Aloes Compositum.** (*Baume de Vie.*)

| | |
|---|---|
| Extract of Socotrine Aloes | 120 grains |
| Myrrh, bruised | 90 grains |
| Saffron, chopped fine | 90 grains |
| Carbonate of Potash | 60 grains |
| Extract of Liquorice | 1 ounce |
| Compound Tincture of Cardamoms | 8 fluid ounces |
| Distilled Water | 22 fluid ounces |

Boil 5 minutes, product 30 ounces.

Contains 4 grains Extract of Aloes in 1 fluid ounce.

*Incompatibles*—Acids; acidulous, earthy, and metallic salts; and all substances which are decomposed by potassæ carbonas.

Dose—½ to 2 ounces.

**Extractum Aloes Socotrinæ.** (Ext. Aloes P.L.)

Socotrine Aloes purified.

(100 parts yield 50 parts of extract.)

Dose—2 to 6 grains.

**Pilula Aloes et Asafœtidæ.**

| | |
|---|---|
| Socotrine Aloes, in powder | 1 ounce |
| Asafœtida | 1 ounce |
| Hard Soap, in powder | 1 ounce |
| Confection of Roses | 1 ounce |

Dose—5 to 10 grains.

### Pilula Aloes et Myrrhæ.

| | |
|---|---|
| Socotrine Aloes | 2 ounces |
| Myrrh | 1 ounce |
| Saffron, dried | ½ ounce |
| Confection of Roses | 2½ ounces |

Dose—5 to 10 grains. (2 grains of Aloes and 1 grain of Myrrh in 6 grains.)

### Pilula Aloes Socotrinæ.

| | |
|---|---|
| Socotrine Aloes, in powder | 2 ounces |
| Hard Soap, in powder | 1 ounce |
| Volatile Oil of Nutmeg | 1 fluid drachm |
| Confection of Roses | 1 ounce |

Dose—5 to 10 grains. (5 grains of Aloes in 10 grains.)

### Tinctura Aloes.

| | |
|---|---|
| Socotrine Aloes, in coarse powder | ½ ounce |
| Extract of Liquorice | 1½ ounce |
| Proof Spirit | 20 fluid ounces |

Macerate 7 days, and then filter.

Dose—1 to 2 drachms. (11 grains Aloes in 1 fluid ounce.)

### Vinum Aloes.

| | |
|---|---|
| Socotrine Aloes | 1½ ounce |
| Cardamom Seeds, bruised | 80 grains |
| Ginger, in coarse powder | 80 grains |
| Sherry | 40 fluid ounces |

Digest 7 days, and filter.

Dose—1 to 2 drachms. (2 grains of Aloes in 1 fluid drachm.)

Socotrine Aloes is also contained in Extractum Colocynthidis Compositum, Pilula Rhei Composita (1 in 6 nearly), Tinctura Benzoini Composita (160 grains to 1 pint).

**ALOE CAPENSIS, Cape Aloes.**—The inspissated juice of the leaf of *Aloe spicata* and other species, imported from the Cape of Good Hope.

**Description.**—This aloes is distinguished by its brilliant glossy fracture and characteristic odour. When viewed by reflected light it has a greenish appearance, and when splinters are examined by transmitted light they are found to be amber-coloured.

**Natal Aloes** is a variety of aloes imported from Natal since 1870 to a considerable extent. It is more like hepatic aloes in appearance, and contains *Nataloin*, already described.

**SCILLA, Squill.**—The sliced and dried bulb of *Urginea Scilla* (*Scilla maritima*), from the Mediterranean coasts.

**Botanical Source.**—The squill is endogenous, being a pear-shaped bulb, usually weighing about 4 lbs. It is tunicated, and has reddish brown outer scales and pale rose fleshy inner scales.

**Collection.**—The bulbs are dug up in August, freed from their dry outer scales, cut across into slices, and dried in the sun.

**Description.**—In dried slices, white or yellowish white, and slightly translucent, something like tragacanth. When exposed to damp the slices become flexible, but when dried they are brittle and readily powdered. The powder is apt to absorb moisture and concrete into an intractable hard mass.

**Uses.**—Expectorant, emetic, and diuretic; used in chronic pulmonary complaints, whooping cough, and in dropsies, when not accompanied by inflammatory symptoms. Dose of the powder, 1 to 3 grains.

**Chemistry.**—Squills contain a large quantity of mucilage, which may be precipitated by the addition of alcohol to a watery infusion. If, after thus separating the mucilage, the alcohol be evaporated and tannic-acid added, a bitter body will be precipitated, which has been called scillitin or sculëin, but which has not been properly investigated.

**Acetum Scillæ.**

| | |
|---|---|
| Squill, bruised ........................ | 2½ ounces |
| Dilute Acetic Acid .................... | 20 fluid ounces |
| Proof Spirit .......................... | 1½ fluid ounce |

Macerate 7 days, add Spirit, and filter.

Dose—15 to 40 minims.

**Oxymel Scillæ.**

| | |
|---|---|
| Vinegar of Squill...................... | 20 fluid ounces |
| Clarified Honey ...................... | 32 ounces |

Evaporate in water-bath to sp. gr. 1·32.

Dose—½ to 1 drachm.

**Pilula Ipecacuanhæ c. Scillâ.** (*Vide* p. 53.)

**Pilula Scillæ Composita.**

| | |
|---|---|
| Squill, in fine powder.................. | 1¼ ounce |
| Ginger, in fine powder ................ | 1 ounce |
| Ammoniacum, in fine powder .......... | 1 ounce |
| Hard Soap, in powder ................ | 1 ounce |
| Treacle, by weight .................... | 2 ounces or q.s. |

Dose—5 to 10 grains. (1 grain of Squill in 5 grains.)

**Syrupus Scillæ.**

| | |
|---|---|
| Vinegar of Squill...................... | 20 fluid ounces |
| Refined Sugar ........................ | 40 ounces |

Product, 60 ounces by weight.

Dose—½ to 1 drachm.

**Tinctura Scillæ.**

| | |
|---|---|
| Squill, bruised ........................ | 2½ ounces |
| Proof Spirit ........................... | 20 fluid ounces |

Macerate 48 hours, then percolate.

Dose—10 to 30 minims. (1 grain of Squill in 9 minims.)

## NATURAL ORDER.—MELANTHACEÆ.

Similar to Liliaceæ, but having *extrorse* anthers, and the fruit commonly dehiscing septicidally.

**SABADILLA, Cevadilla.**—The dried fruit of *Asagræa officinalis*, imported from Mexico.

**Description.**—Each fruit consists of three brown papery follicles, about ¼ inch long, containing each from 1 to 3 seeds.

**Chemistry.**—It is used for extracting the alkaloid veratria.

**Veratria,** $C_{32}H_{52}N_2O_8$, is prepared as follows:—Macerate 2 pounds of Cevadilla with half its weight of boiling distilled water in a covered vessel for 24 hours; remove the cevadilla; squeeze it and dry it thoroughly with a gentle heat; beat it now in a mortar, and separate the seeds from the capsules by brisk agitation in a deep narrow vessel, or by winnowing it gently on the table with a sheet of paper; grind the seeds in a mill, and form them into a thick paste with rectified spirit. Pack this firmly in a percolator, and pass rectified spirit through it until the fluid ceases to be coloured; concentrate the spirituous solution by distillation so long as no deposit forms, and pour the residue while hot into 12 times its volume of cold water. Filter through calico, and wash the residue on the filter with distilled water until the washings cease to give a precipitate with ammonia. To the united filtered liquids add solution of ammonia in slight excess; collect the precipitate on a filter, and wash it with water until the fluid passes colourless. Diffuse the moist precipitate through 12 ounces of water, and add gradually, with diligent stirring, sufficient hydrochloric acid to make the fluid feebly but persistently acid. Then add 60 grains of purified animal charcoal; digest at a gentle heat for 20 minutes; filter, and allow the liquid to cool. Add ammonia in slight excess; collect the precipitate on a filter, and wash it with cold water till the washings cease to be affected by nitrate of silver acidulated with nitric acid. Lastly, dry the precipitate—first by imbibition with filtering paper, and then by the application of a gentle heat.

The Veratria is, in this process, extracted in its natural state as a gallate of veratria, together with resin and alkaloid matter. When the concentrated tincture is poured into water, the resin is precipitated. The addition of ammonia then causes precipitation of the crude veratria, which is further purified by solution in acid and decolorisation by animal charcoal, and reprecipitation by ammonia.

As thus prepared veratria is pale grey and amorphous, the minutest quantity producing instant irritation if breathed into the nostrils. It is insoluble in water, but soluble in spirit, ether, and dilute acids. With concentrated sulphuric acid it become first yellow, then red, and finally violet.

Veratria is a violent irritant poison, which has been used as a substitute for colchicum in gout. Externally, in the form of ointment, it is rubefacient and errhine; and sometimes used in neuralgia and rheumatism.

**Unguentum Veratriæ.**

| | |
|---|---|
| Veratria | 8 grains |
| Prepared Lard | 1 ounce |
| Olive Oil | ½ fluid drachm |

COLCHICI CORMUS.—The fresh corm, and the same stripped of its coats, sliced transversely and dried, at a temperature not exceeding 150° F. of *Colchicum autumnale*, indigenous.

**Botanical Source.**—The colchicum is a herb with leaves broadly lanceolate, and about 1 foot long, appearing in spring. In early summer the leaves fall off, and in autumn the flowers appear in the form of pale lilac perianths, which die away and form so-called capsules, ripening in the following spring.

**Collection.**—The corm should be dug up and brought to market in July, during the period of the decay of the leaf and the production of the flower.

**Description.**—When dried in flat pieces about 1-10th of an inch thick, white, starchy and more or less reniform in shape.

**Uses.**—Colchicum is a sedative and irritant; in small doses nauseant, cathartic, diuretic, frequently given in gout and acute rheumatism; in large doses an irritant poison.

**Chemistry.**—The active constituent is an alkaloid called *colchicia*, $C_{17}H_{19}NO_5$. It is crystalline, soluble in water and alcohol, and is closely allied to veratria, but does not cause sneezing. It turns deep violet with nitric acid.

### Extractum Colchici.

The juice of the fresh Colchicum corms, evaporated to an extract, after the feculence has deposited.

(100 lbs. of corms yield 4 lbs. of extract.)

Dose—½ to 2 grains.

### Extractum Colchici Aceticum.

| | |
|---|---|
| Fresh Colchicum Corms, deprived of their coats ............................ | 7 lbs. |
| Acetic Acid .......................... | 6 fluid ounces |

(100 lbs. of Corms yield 5½ lbs. of extract.)

Dose—½ to 2 grains.

### Vinum Colchici.

| | |
|---|---|
| Colchicum Corm, dried, sliced and bruised | 4 ounces |
| Sherry ............................ad. | 20 fluid ounces |

(Macerate 7 days, press, and strain through calico.)

Dose—10 to 30 minims. (1 grain of Colchicum Corm in 9 minims.)

**COLCHICI SEMINA, Colchicum Seeds.**—The ripe seeds of the plant already described. They are small and spherical, about 1-10th of an inch in diameter, hard and difficult to powder, reddish brown in colour, but dull and wrinkled.

**Chemistry.**—Like the Colchicum corm.

**Antidotes.**—Similar to veratria.

**Tinctura Colchici Seminum.**

| | |
|---|---|
| Colchicum Seeds, bruised .............. | 2½ ounces |
| Proof Spirit ........................ ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

Dose—10 to 30 minims. (1 grain of Colchicum Seeds in 9 minims.)

**VERATRI ALBI RADIX, White Hellebore Root.** — The dried acrid rhizome of *Veratrum album*, from the Alps, Pyrenees, and other mountainous districts of Central and Southern Europe.

**Botanical Source.** — The *V. album* grows from 1½ to 3 feet high, has a præmorse root stalk, and elliptic and plicate leaves, pubescent beneath. The flowers are in paniculate racemes of a yellowish white colour, greenish at the base.

**Description.**—A cylindrical root of a dull earthy black, the top being crowned with the bases of leaves, and the lower part much beset by the scars of rootlets. Internally it is nearly colourless, and a section shows a bright white ring surrounding a spongy buff coloured meditullium.

**Uses.**—A hydragogue, cathartic, and in over doses produces vomiting and purging. It is now chiefly used to destroy pediculi.

**Chemistry.**—Contains the alkaloid veratria, and has also been said to contain traces of three other allied alkaloids, viz., sabadilline, colchicine and jervine.

**VERATRI VIRIDIS RADIX, Green Hellebore Root.**—The dried rhizome of *Veratrum viride*, collected in autumn in the United States and Canada.

**Botanical Source.**—The green hellebore is an annual herb with bright green leaves, oval-acuminate in shape, pubescent, plated and amplexicaul. The inflorescence is a panicle of greenish yellow flowers with a six-parted perianth.

**Description.**—It is very similar to white hellebore, but easily distinguishable by being either sliced or cut lengthwise before drying.

**Uses.**—Similar to white hellebore.

**Chemistry.**—Contains the alkaloids veratria and jervia, and is in most respects similar to the white hellebore.

**Tinctura Veratri Viridis.**

| | |
|---|---|
| Green Hellebore Root, in coarse powder | 4 ounces |
| Rectified Spirit ....................ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

Dose—5 to 20 minims. (1 grain of Hellebore Root in 5½ minims.)

## NATURAL ORDER.—PALMACEÆ.

**ARECA, Areca or Betel Nut.**—The seeds of *Areca Catechu*, from Ceylon and the Malayan Archipelago.

**Botanical Source.**—The areca palm is a tall tree, frequently 50 feet in height.

**Description.**—Similar to a nutmeg, but rather larger, and often enclosed in a peculiar fibrous pericarp.

**Uses.**—An astringent and anthelmintic for the expulsion of tænia. Charcoal prepared from the nuts is esteemed as a dentifrice.

Dose, 10 to 15 grains for diarrhœa, and ¼ to ½ ounce for tapeworm.

**Chemistry.**—Its active principle is tannic acid.

**SANGUIS DRACONIS, Dragon's Blood.**—A resinous substance exuding from the fruit of *Calamus Draco*, chiefly from Singapore and Batavia.

**Description.**—It is a hard deep red substance, almost entirely soluble in spirit of wine. The finest quality is in sticks neatly wrapped in palm leaf, and tied with transverse bands of dried grass. The inferior is in lumps containing remains of the fruit, of which only about two-thirds are soluble in spirit of wine.

**Uses.**—As a colouring matter for plasters, tooth powders, and varnishes.

**Chemistry.**—The resin of dragon's blood has been stated to have the formula of $C_{20}H_{20}O_4$.

**Specially Distinctive Tests.** — 1. Completely soluble in chloroform and ether, the latter solution giving no turbidity with alcohol.

2. Soluble in alcohol, and the addition of alcoholic ferric chloride (1 in 10) gives a greenish brown; but alcoholic plumbic acetate gives no precipitate, while ammonium hydrate gives a turbid mixture.

The dragon's blood from *Pterocarpus Draco*

(Leguminosæ) is not so soluble in chloroform, but readily dissolves in ether; the addition of ammonium hydrate to the red alcoholic solution gives no turbidity.

SAGO.—The starch obtained from the interior of the stem of various species of *Sagus*, growing in swampy districts of the Indian Archipelago.

## NATURAL ORDER.—ACORACEÆ.

[AROIDEÆ.]

### CALAMI AROMATICI RHIZOMA,

**Sweet Flag.**—The rhizome of *Acorus Calamus*, indigenous.

**Description.**—As usually found it is rough and shrunken, varying in colour from orange-brown to dark brown externally, with a dull brown spongy interior. On the upper surface it is marked with scars of leaves, and on the end with zigzag lines of little elevated dot-like rings.

**Uses.**—An aromatic stimulant, and believed by some to be anti-spasmodic.

**Chemistry.**—It yields an essential oil, isomeric with turpentine and a bitter principle called *acorin*.

## SUB-CLASS III.—GLUMACEÆ.

Plants having the flowers enclosed in glumes and paleæ.

## NATURAL ORDER.—GRAMINACEÆ.

Herbs, shrubs, or arborescent plants with hollow, round and jointed stem; leaves alternate with ligules and split sheaths; inflorescence in locustæ; flowers achlamydeous, furnished with paleæ and glumes; stamens 1—6, with versatile anthers, and ovary superior 1-celled, with a feathery stigma; fruit, a caryopsis.

**HORDEUM DECORTICATUM, Pearl Barley.** — The husked seeds of *Hordeum distichon*, cultivated in Britain.

**Uses.**—Emollient, demulcent and nutritive.

**Chemistry.**—Similar to wheat flour, but not quite so rich in gluten.

**Decoctum Hordei.**

| | |
|---|---|
| Pearl Barley.......................... | 2 ounces |
| Distilled Water ...................... | 1½ pint |

Wash in cold water, boil 20 minutes, and strain.

**TRITICI FARINA, Wheat Flour.**—The flour ground from the fruits of *Triticum vulgare*, which have been separated from the perianth by thrashing.

**Chemistry.**—It contains 68 per cent. of starch, 10 per cent. of gluten, 5 per cent. of sugar, 4 per cent. of gum, and the remainder water and mineral matters, consisting chiefly of phosphates. When some flour is placed on a cloth and washed with water, the starch passes through, the gluten remaining on the cloth. Gluten differs from starch in containing nitrogen, and it therefore is considered to be a flesh-forming article of food, in contradistinction to starch, sugar or fat, which are only heat-producing bodies.

**AMYLUM, Starch, $C_6H_{10}O_5$.**—Procured from the above. In white columnar masses. Triturated with a little cold distilled water it is neither acid nor alkaline to test paper; the filtered liquid does not become blue on the addition of iodine in solution; mixed with boiling water and cooled it gives a deep blue colour with iodine, of amidin iodide. (See Author's Pharmaceutical Chemistry.)

**Glycerinum Amyli.** *(1 in 11, by weight.)*

| | |
|---|---|
| Starch | 1 ounce |
| Glycerin | 8 fluid ounces |

Rub them together until they are intimately mixed, then transfer the mixture to a porcelain dish, and apply a heat gradually raised to 240° F. It should be constantly stirred until the starch particles are completely broken, and a translucent jelly is formed. The original compound was called Plasma, before it became an official preparation.

**Mucilago Amyli.** (12 grains to 1 fluid ounce.)

Triturate the starch with water, gradually added, and boil for a few minutes, constantly stirring.

Starch is also contained in Pulvis Tragacanthæ Compositus (1 in 6).

SACCHARUM PURIFICATUM. — (See Author's Pharmaceutical Chemistry.)

# SUB-KINGDOM II.—CRYPTOGAMIA.

FLOWERLESS PLANTS PROPAGATED BY SPORES.

## CLASS III.—ACOTYLEDONES.

**Plants having no seeds but propagated by spores; germination heterorhizal; stem (when present) acrogenous; leaves (when present) furcate in venation; flowers none.**

## SUB-CLASS I.—ACROGENÆ.

**Plants with stems and leaves distinguishable and possessing stomata.**

## NATURAL ORDER.—FILICES.

**Herbs with rhizomes or arborescent plants with acrogenous stems; leaves (fronds) with furcate venation; fructification in *sori*, usually on the under surface or margins of the frond; spores enclosed in *sporangia*.**

**FILIX MAS, Male Fern.**—The dried rhizome, with the bases of the foot stalks and portions of the root fibres attached of *Aspidium Filix Mas*, collected in summer from indigenous plants.

**Uses.**—For exciting muscular action in the bowels, and therefore useful for expelling worms. The dose in powder is from 60 to 180 grains, as a specific (not official) against tapeworms.

**Chemistry.**—It contains a little volatile oil, 6·9 per cent. of a green fixed oil, 4·1 per cent. of resin, together with tannin, starch, sugar and gum. When treated with ether it yields 8 per cent. of an extract containing a crystalline substance called *filicic* acid, $C_{14}H_{18}O_5$, which, when fused with potash, is resolved into butyric acid and another substance. This is probably the active constituent.

**Extractum Filicis Liquidum.**

| | |
|---|---|
| Fern root, in coarse powder | 32 ounces |
| Ether | 4 pints, or q.s. |

Exhaust by percolation, and evaporate to an oily extract.

Dose—15 to 30 minims.

## NATURAL ORDER.—LYCOPODIACEÆ.

**LYCOPODIUM.**—The spores of *Lycopodium clavatum*, or club-moss, from indigenous plants, but chiefly imported from Central and Northern Europe.

**Botanical Source.**—The *L. clavatum* is a moss with a long creeping stem; leaves linear-cylindrical and imbricate, terminating in hair-like processes; fructification sessile, in the axils of the leaves; spores tetrahedral, with 4 facets, and covered with hexagonal network.

**Description.**—A straw-yellow mobile and inodorous powder, which, although specifically heavier than water, floats on its surface, owing to occlusion of air on the netted surface of the grains. Very inflammable.

**Uses.**—For dusting scalded surfaces, and for preventing the adhesion of soft pills. Reputed among herbalists as violently purgative and emmenagogue.

**Chemistry.**—Contains, when pure, under 5 per cent. of water, and yields an ash of 4 per cent., the chief constituent of which is aluminium phosphate. Ether extracts 48 per cent. of a fixed oil. It is adulterated sometimes by starch and magnesia; test, the microscope.

## SUB-CLASS II.—THALLOGENÆ.

Plants without distinction of stem and leaf and destitute of stomata.

## NATURAL ORDER.—LICHENES.

CETRARIA (B.P.), Iceland Moss.—The entire plant of *Cetraria islandica*, from the North of Europe.

**Botanical Source.**—The *C. islandica* is an epiphyte with an erect, smooth, leathery and dry thallus, from 2 to 4 inches high: fructification in rusty brown rounded apothecia on the apices of the thallus.

**Description.**—Has the characters named above, and when dry is brownish white above but lighter in colour beneath.

**Uses.** — Demulcent, nutritive and slightly tonic; useful in advanced phthisis.

**Chemistry.** — By first extracting with boiling rectified spirit, and then boiling the residue in water, concentrating and precipitating by spirit of wine, about

70 per cent. of a peculiar body called *lichenin*, or lichen-starch is obtained. Its formula is $C_{12}H_{20}O_{10}$.* and it may be regarded as a polymer of starch and cellulose, partaking of certain qualities of both, and being soluble in ammoniacal oxide of copper as well as tinged blue by iodine. By boiling with dilute acid it is converted into dextrin and sugar. The bitter principle is *Cetraric* acid, $C_{18}H_{16}O_8$, of which it contains 3 per cent., and there is also a little fat, fumaric acid and sugar. The cetraric acid may be extracted by a weak solution of potassium carbonate, and this yields, on evaporation, a yellow bitter salt.

**Decoctum Cetrariæ.**

| | |
|---|---|
| Iceland Moss ........................ | 1 ounce |
| Distilled Water ...................... | 1 pint |

Boil 10 minutes in a covered vessel, and strain while hot, product, 20 fluid ounces.

*Incompatibles*—The alkalies and their carbonates; most metallic salts, and iodine.

**LITMUS** (B.P.), **Lacmus.**—A blue pigment prepared from various species of *Roccella*, and imported from Holland.

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* This formula is wrong in the books, it should be $C_{18}$, as here written.

**Botanical Sources.**—The two chief species used are the *R. tinctoria* and *R. fuciformis*, the former having a thallus branching and cylindrical in form, and the latter possessing a flat one. These are obtained in the Canary Islands.

**Manufacture.**—The lichens are exposed to the air after grinding, in a solution of potassium and ammonium carbonates. They are then treated with ammonium hydrate, and the whole digested for some hours more, and decanted. After exposure to the air for several weeks, this solution is evaporated and made into cakes with plaster of Paris and chalk.

**Description.**—In small light cubical masses about ¼ inch square, having an indigo-blue colour, and an odour something like that of violets. It yields its blue colour both to water and spirit.

**Uses.**—Acids and acid salts turn blue litmus paper red, while alkalies or any alkaline salt, such as sodæ phosphas, or plumbi subacetas, turn red litmus paper blue.

**Chemistry.**—The essential constituent of the blue colour is *orcein*, $C_7H_7NO_3$, which is produced by the joint action of oxygen and ammonia upon *orcin*, $C_7H_8O_2$:

The latter substance, even, is not contained in the litmus, but is the product of the action of potassium carbonate upon certain acids existing in the litmus, the chief of which are *orsellic* acid, $C_8H_8O_4$, *erythric* acid, $C_{20}H_{22}O_{10}$, and *evernic* acid, $C_{17}H_{16}O_7$.

**Tincture of Litmus.**

1 in 10 of proof spirit. Macerate for 2 days, and filter.

**Blue Litmus Paper.**

By steeping slips of unsized paper in the tincture, and drying by exposure to the air.

**Red Litmus Paper.**

By reddening the tincture with a minute quantity of diluted sulphuric acid, and steeping paper into the solution.

Instead of using two kinds of paper, it is preferable to prepare what is called "neutral" litmus paper of a pale purple colour, which will show both the changes to red and to blue. This is effected by boiling ¼ ounce of litmus in 4 ounces of water for 20 minutes, filtering, making up with water to exactly 4 ounces, and dividing into two equal parts. To one part *exceedingly* diluted sulphuric acid is added, drop by drop, till it turns red; and the other portion is then poured into it, and slips of unsized paper passed slowly through the liquid and hung up to dry.

## NATURAL ORDER.—FUNGI.

Cellular plants growing in or upon living or decaying organic substances, and nourished through their vegetative structure called the mycelium (spawn); fructification various and produced in the air.

**ERGOTA** (B.P.), **Ergot of Rye.**—The compact mycelium or spawn (sclerotium) of *Claviceps purpurea*, produced within the paleæ of *Secale cereale*, in Southern Russia and Spain, but chiefly in Gallicia.

**Botanical Source.**—The first sign of the grain of rye being attacked by ergot is, according to Tulasne, the appearance of a yellow mucus called honeydew. This sweet exudation attracts many insects which thus help to propagate the infection to other grains. The dew soon disappears and leaves the young ovaries covered by a white spongy mycelium of the fungus which penetrates the entire grain and develops *hyphæ*, or thread-like cells, covered externally by *basidia*. The epicarp and embryo of the caryopsis are especially attacked and its growth is stopped, while at its base is formed by tumefaction and compaction of the mycelium, a mass gradually increasing in size, which is the *sclerotium*. This in time separates from the first mycelium by the drying up of the latter, and pushes the surviving portion of the apex of the caryopsis up so that it is visible above the paleæ. In collection this portion usually drops off, and is not found in commercial ergot.

If a portion of the ergot be placed on damp earth it develops a little *stipe* and *pileus* and all the other characteristics of a minute mushroom; but this development does not take place on the grain, and unless the *sclerotium* falls on suitable places its vitality for propagation only appears to last one season.

**Description.** — In violet-brown elongated masses about 1 inch long, obtuse at the ends, curved, and sub-triangular, with a longitudinal furrow on the concave side. It is pinkish within and breaks with a short fracture, and gives a faint but peculiar odour, which is much increased by rubbing with potassium hydrate.

**Uses.** — To assist parturition by causing, usually within 20 minutes after its administration, rapid and violent uterine contractions which continue without intermission until the birth is completed and the placenta expelled. It is also used in menorrhagia in doses up to 15 grains. The dose in parturition is up to 30 grains. It is an aid to midwifery which should only be given under certain circumstances and with extreme discretion, and under the advice of an experienced practitioner.

**Chemistry.**—Ergot contains 30 per cent. of a non-drying oil which is a mixture of glycerides of oleic and palmitic acids, with several glycerides of soluble and volatile fatty acids, such as butyric, lactic, acetic and formic. It also yields 7 per cent. of resin, with traces of cholesterin, mycose (a peculiar sugar), and some soluble albumen. The colouring matter is red and insoluble in ether and alcohol, but soluble in alcoholic ammonium hydrate.

The real active principle appears to be a base called *ecbolia,* which exists to the extent of ·16 per cent. combined with ergotic acid. Another, but apparently inert base called *ergotine,* $C_{50}H_{52}N_2O_3$, is also present to the amount of ·12 per cent. These bases, after mutual extraction in the ordinary manner suitable for alkaloids, may be separated by mercuric chloride, which precipitates only *ecbolia*.

### Extractum Ergotæ Liquidum.

| | |
|---|---|
| Ergot, in coarse powder .............. | 16 ounces |
| Ether........ (should be 40 fluid ounces) | 20 fluid ounces |
| Rectified Spirit ...................... | 8 fluid ounces |
| Distilled Water ...................... | 3½ pints |

Product, 16 ounces.

The Ether is merely employed to separate the inert oil.

(1 drachm is equivalent to 1 drachm of Ergot.)

Dose—10 to 30 minims.

### Infusum Ergotæ.

| | |
|---|---|
| Ergot, in coarse powder................ | ¼ ounce |
| Boiling Distilled Water................ | 10 fluid ounces |

Infuse in a covered vessel for ½ hour, and strain.

*Incompatibles*—Astringents, metallic salts.

Dose—1 to 2 ounces. (About 11 grains of Ergot in 1 fluid ounce.)

### Tinctura Ergotæ.

| | |
|---|---|
| Ergot, in coarse powder ............. | 5 ounces |
| Proof Spirit........................ad. | 20 fluid ounces |

Macerate 48 hours, then percolate.

Dose—10 minims to 1 drachm. (1 grain of Ergot in 4½ minims.)

## NATURAL ORDER.—ALGÆ.

Cellular plants, growing in fresh or salt water, or in moist situations; thallus branched or filamentous; fructification various or wanting; reproduction by spores, tetraspores, and antheridia, or by simple conjugation and cell division.

**CHONDRUS CRISPUS, Carragheen,** *Irish Moss.*—The entire alga bleached and dried by exposure to the sun, chiefly on the West Coast of Ireland.

**Description.**—A whitish dichotomously-cleft thallus, with cuneate segments; having here and there elliptical *sori* embedded in the thallus (distinction from Iceland moss).

**Uses.**—Demulcent, and to a small extent nutritive and alterative. Half an ounce, steeped in water and boiled in a pint of milk, makes a very firm jelly for invalids.

**Chemistry.**—Irish Moss consists chiefly of mucilage, which, although it contains no starch, is yet slightly coloured blue by iodine. Ash 15 per cent., with traces of iodides and bromides.

**GRACILARIA LICHENOIDES, Ceylon Moss.**—A decoction is used as a demulcent.

# MATERIA MEDICA

OF THE

# ANIMAL KINGDOM.

# SUB-KINGDOM I.—PROTOZOA.

(πρῶτος, first; ζῶον, animal.)

Size minute, composed of sarcode; the body not showing any differentiation of parts, and the nervous system absent.

## CLASS.—RHIZOPODA.

(ῥίζα, a root; πούς, ποδός, a foot; so-called because the pseudopodia spread out like roots.)

Simple or compound animals, possessing the power of emitting pseudopodia.

### Order.—SPONGIDA.

**SPONGIA OFFICINALIS, Sponge.**—The skeleton of *Spongia officinalis*, imported from the Mediterranean and Red Seas, and from the West Indies. The sponges were placed, by Grant, in a class named Porifera.

**Varieties.**—The finest are Turkey sponges, and the inferior the West Indian; all contain sand and minute shells, which have to be removed by washing before use.

**Uses.** — Domestic. Medically, calcined sponge, *Spongia usta*, was used for the cure of glandular swellings, probably on account of the sodium iodide and magnesium bromide it contained.

*Sponge tents*, being compressed sponge saturated with wax, were formerly employed to dilate contracted canals, chiefly the cervix uteri.

**Chemistry.**—Sponge tissue is chiefly gelatin and coagulated albumen, with a good deal of mineral matter, especially silicates, carbonates, phosphates and iodides.

# SUB-KINGDOM II. — CÆLENTERATA

AND

# SUB-KINGDOM III.—ANNULOIDA,

*Not important to Materia Medica.*

# SUB-KINGDOM IV.—ANNULOSA.

[RINGED ANIMALS.]

Animals possessing a segmented body arranged along a longitudinal axis. The nervous system consists of a double chain of ganglia situated on the neutral surface of the body, and transversed anteriorly by the œsophagus.

## DIVISION I.—ANARTHROPODA.

(Without joints—*α*, without; *ἄρθρον*, a joint; *πούς*, a foot.)

Locomotive appendages not distinctly jointed or articulated to the body.

### CLASS.—ANNELIDA.

External surface of the body clearly segmented. The ventral nerve cord ganglionated.

## ORDER.—HIRUDINEA.

The sexes are united, and the young do not pass through any metamorphosis. The posterior, or both ends of the body, possess a locomotive and adhesive sucker. Foot tubercules and bristles absent.

**HIRUDO (B.P.), the Leech.**—Official leeches are either the speckled variety, *Sanguisuga medicinalis*, or the green leech, *S. officinalis*, collected in Spain, France, Italy and Hungary. Leeches are androgynous, each possessing male and female organs. They propagate by eggs.

**Description.** — *S. medicinalis.* Back with six longitudinal reddish bands, on a greenish brown ground; belly yellowish green with many black spots and yellowish intervening spaces; rings varying from 93 to 108; teeth 80 to 90.

*S. officinalis.* Back dark green, with six longitudinal but interrupted reddish stripes; belly olive-green and without spots; teeth not exceeding 75, usually 70.

**Preservation.**—In water kept from putrefaction by the addition of a few fragments of iron. Unglazed brown pans may be advantageously used tied over with coarse cloth so as not to exclude air. The aquarium principle has been adopted with success. A bed composed of clean pebbles of various sizes mixed with sand and a little moss has been found to answer well. The containing jar should be kept at a moderate temperature, and preferably in an underground situation.

**Uses.**—For extracting blood, each leech taking from 1 to 2 drachms, capable of being increased to 4 drachms by subsequent fomentation.

# DIVISION II.—ARTHROPODA, Or ARTICULATA.

(ἄρθρον, a joint; ϖούς, a foot.)

## CLASS.—INSECTA.

Head, thorax and abdomen distinct. Six legs borne on the thorax, and two pairs of wings on the same portion of the body; antennæ 2 in number; respiration effected by tracheæ.

# ORDER.—HEMIPTERA.

(ἥμι half; πτερὸν a wing; *i.e.*, having half of the elytra membranous.)

## SUB-ORDER.—HOMOPTERA.

(ὁμὸς, similar; πτερὸν, a wing.)

**COCCUS** (B.P.), **Cochineal.** — The dried, matured and fecundated female insect of *Coccus cacti*, reared in Mexico and Teneriffe.

**Description.** — *Females.* — Body broadly elliptical, bluish red, about 1-6th of an inch long, and usually covered with a silvery white powder which is of a fatty nature melting by heat, when the insect becomes reddish black; *apterous* with a *rostrum* and antennæ short.

*Males.*—Deep red, only half the size of the female, with two long divergent setæ at the posterior end; *rostrum* absent; antennæ nearly as long as the body.

**Uses.**—As a colouring matter, and reputed (but without foundation) to be anodyne and anti-spasmodic.

**Chemistry.**—The colouring matter of cochineal may be isolated by first percolating with ether to remove fat, and then macerating in alcohol. After distilling off the spirit it remains as a rose coloured powder, soluble in water and alkalies, forming deep purple solutions. It is not changed by dilute sulphuric or hydrochloric acids: it is turned yellow by nitric acid, chlorine, iodine and bromine. It may be precipitated as an insoluble *lake* by plumbic acetate, and forms with tin salts a bright crimson solution. Its formula is $C_{14}H_{14}O_8$, and it has been variously called *carmine*, *carminic acid* and *cochinellin*.

**Tinctura Cocci.**

| | |
|---|---|
| Cochineal, in powder .................. | 2½ ounces |
| Proof Spirit......................ad. | 20 fluid ounces |

Macerate 7 days, strain, press, and filter.

(7 grains of Cochineal in 1 drachm.)

Cochineal is an ingredient in Tinctura Cardamomi Composita and Tinctura Cinchonæ Composita.

**Commercial Varieties.**—Three kinds are imported under the names of Honduras, Mexican or Vera Cruz, and Teneriffe. The two first are distinguished into the silver and black varieties. An inferior kind is known under the name of *Granilla*.

It has been usually stated that the silver-grey cochineal are most esteemed, but at present it is not really so, the finest being the large, heavy, and perfect blacks, the seconds being the silver-grey, and the lowest the light and broken blacks. It has also been stated that the low quality of blacks are mixtures of unfecundated females and males, but the author's researches conducted on a great number of samples, have proved that all the cochineal of commerce is practically composed of fecundated females. The inferior qualities, however, consist chiefly of females which have been attacked by a species of ichneumon during life, and the interior organs either partially or wholly eaten away.

**Adulterations.**—Powdered barium sulphate used to be dusted over genuine cochineal previously moistened with gum water. A much heavier sp. gr. was thus obtained. The fraud was concealed by means of ivory black. Lead carbonate has been employed to give a silvery appearance.

# ORDER.—HYMENOPTERA.

(ὑμὴν, a membrane; πτερὸν, a wing.)

## SECTION.—ACULEATA.

The ovipositor is in connection with a gland which secretes a poisonous fluid, and is used as a weapon of defence (*aculeus*, a sting).

**MEL** (B.P.), **Honey.**—A saccharine secretion deposited in the honeycomb by the *Apis mellifica*, or hive bee.

**Collection.**—The bees are killed by sulphurous vapours, and, the honeycombs having been removed, the honey is permitted to drain spontaneously. An inferior quality is obtained by pressure in bags.

Other modes of collection have been introduced with success. In Denmark an ingenious plan is adopted of replacing the honeycomb three separate times by means of moveable frames. A much larger yield of honey is thus secured, and its production has become a national industry.

The mechanical arrangement of the frames is an improvement over the ordinary construction of the hive. Experiment has shown that the bee gathers honey three times in excess of the wax necessary to form the honeycomb.

**Uses.**—Demulcent, nutritive, and slightly laxative.

**Chemistry.**—Honey consists essentially of sugar and water, with flavouring matters from the flowers from which it has been collected by the bees. It contains three distinct sugars, viz.:—

1. **Sucrose**, or *cane sugar*, $C_{12}H_{22}O_{11}$, which is crystallisable and immediately blackened by heating with dilute sulphuric acid, but not by potassium hydrate.

2. **Glucose**, *dextrose* or *grape sugar*, $C_6H_{12}O_6.H_2O$, which is also crystalline, but does not blacken on heating with dilute sulphuric acid, but at once turns dark with potassium hydrate.

3. **Lævulose**, or *fruit sugar*, $C_6H_{12}O_6$, which is uncrystallisable, behaves with re-agents like glucose, but turns the plane of polarisation of light to the left.

Both glucose and lævulose precipitate red cuprous oxide from **Fehling's Solution of Copper**, while sucrose does not.

This solution is made by dissolving 350 grains of cupric sulphate in water, adding 1730 grains of Rochelle salt, and 600 grains of potassium hydrate, and making the whole up to 10,000 grains with water. It is of a clear deep blue, and should not alter when boiled with ten times its bulk of distilled water. 100 grains of this solution will be exactly decolorised by ·5 grain of pure grape or fruit sugar.

### Mel Boracis.

| | |
|---|---|
| Borax, in fine powder .................. | 64 grains |
| Clarified Honey ...................... | 1 ounce |

The solution of the borax in 1 drachm of glycerin, added to 6 drachms of Honey, is an improvement. (*Squire.*)

### Mel Depuratum.

Honey melted in a water-bath, and strained, while hot, through flannel moistened with warm water.

### Oxymel.

| | |
|---|---|
| Clarified Honey ...................... | 40 ounces |
| Acetic Acid .......................... | 5 fluid ounces |
| Distilled Water ...................... | 5 fluid ounces |

Sp. gr. 1·320.

Dose—1 to 2 drachms.

Honey is also contained in Confectio Piperis, Confectio Scammonii, Confectio Terebinthinæ, and Oxymel Scillæ.

**Adulterations.**—1. *Starch*, detected by boiling with water, and then testing with iodine solution.

2. *Cane sugar*. Owing to the fact that honey really contains a small quantity of sucrose, this adulteration can only be detected by a quantitative estimation of the the cane sugar, by first estimating the glucose and lævulose by means of Fehling's solution, and then boiling another portion with a few drops of dilute sulphuric acid to convert the sucrose into lævulose, and once more estimating with Fehling's solution. Any excess of sugar found in the second estimation over 5 per cent. may be taken as deliberate adulteration. The older the honey the less is the natural amount of sucrose, and in most commercial samples it does not exceed 1 per cent.

3. *Glucose*. This sugar is now much more used than sucrose for adulterating honey, as it is made from starch in great quantities and at very small cost by the action of dilute sulphuric acid and subsequent neutralisation with lime. Its detection is a matter of experience in the analysis of sugars, and would be too lengthy for detail, suffice it to say that the process depends:—(1). On a total estimation of the glucoses (both dextrose and lævulose) by means of Fehling's

solution. (2). The subsequent use of the polarimeter to determine the respective amounts of right and left handed sugar present. Those who have no polarimeter may separate the glucose and lævulose by taking 100 grains of the honey dried at 212° F. and triturating well with 60 grains of calcium hydrate (pure) and 1,000 grain measures of water. The insoluble calcium salt of lævulose thus produced, having been separated by filtration and pressure, is suspended in water, carbonic anhydride is passed to precipitate the calcium, and the whole is then filtered and evaporated on a water-bath and dried at 212° F., or still better *in vacuo.*

**CERA FLAVA, Yellow Wax.**—The prepared honeycomb of *Apis mellifica.*

**CERA ALBA, White Wax.**—Yellow wax bleached by exposure to moisture, air and light.

**Collection.**—Yellow wax is left in the bags after the expression of the honey, and is melted in hot water and then cooled. White wax is prepared by allowing melted wax to run in thin streams upon revolving cylinders kept wet. It thus forms very thin ribbons which are exposed moist to air and light until bleached. The same action is more rapidly obtained by the action of oxidants, such as dilute nitric acid and potassium permanganate. Chlorine is sometimes employed, but it acts chemically on the wax.

**Description.**—*Yellow wax* has an odour of honey, is not greasy to the touch, and does not melt under 140° F. It is quite insoluble in cold alcohol, but soluble in turpentine.

*White wax* is nearly white and translucent, not greasy and does not melt under 150° F.

**Chemistry.**—When wax is boiled with alcohol it is divided into 2 parts: one totally insoluble (73 per cent.), and the other soluble (22 per cent.) but crystallising out on cooling. The former is *Melissyl palmitate* $C_{30}H_{61}.C_{16}H_{31}O_2$, which can be obtained by dissolving the insoluble portion in benzol and crystallising. It melts at 147·2° F., and is soluble in ether and turpentine. The latter is *Ceryl Cerotate*, $C_{27}H_{55}.C_{27}H_{53}O_2$, and is also soluble in ether. The colour and odour of yellow wax is due to about 5 per cent. of an acid fat called *cerolein*, soluble in cold alcohol.

*Yellow wax* is contained in Emplastrum Calefaciens, Emplastrum Cantharidis, Emplastrum Cerati Saponis, Emplastrum Galbani, Emplastrum Picis, Unguentum Cantharidis, Unguentum Hydrargyri Compositum, Unguentum Hydrargyri Oxidi Rubri, Unguentum Picis Liquidæ, Unguentum Resinæ, Unguentum Sabinæ, and Unguentum Terebinthinæ.

*White wax* is contained in Charta Epispastica, Suppositoria Acidi Tannici, Suppositoria Hydrargyri, Suppositoria Morphiæ, Suppositoria Plumbi Composita, Unguentum Cetacei, Unguentum Plumbi Subacetatis Compositum, and Unguentum Simplex.

**Unguentum Simplex.**

| | |
|---|---|
| White Wax | 2 ounces |
| Prepared Lard | 3 ounces |
| Almond Oil | 3 ounces |

*Unguentum Simplex* is contained in Unguentum Antimonii Tartarati, Unguentum Cadmii Iodidi, Unguentum Creasoti, Unguentum Elemi, Unguentum Hydrargyri Ammoniati, Unguentum Hydrargyri Iodidi Rubri, Unguentum Plumbi Carbonatis, and Unguentum Plumbi Iodidi.

## ORDER.—COLEOPTERA.

(κολεὸς, a sheath or case; πτεζὸν, a wing.)

**CANTHARIS (B.P.), Spanish Fly.**—The dried beetle *Cantharis vesicatoria*, collected chiefly in Hungary.

**Description.**—About ⅓ to 5-6ths of an inch long and 1-6th of an inch broad. At once recognised by their long shining and golden-green wing cases (*elytra*) covering two thin membranous and brownish wings.

**Collection.**—At a certain time in the hot season they suddenly make their appearance, and are in such quantity that their offensive odour causes the inhabitants to desert the public streets in the villages during the period of ten days, which is their time of existence. They are found chiefly on the ash, privet, and lilac, and are shaken off the trees into vinegar, and then dried in the sun or by artificial heat.

**Uses.**—Externally as a vesicant, and internally as a violent irritant poison. It is reputed to be a powerful aphrodisiac, or stimulant to the sexual organs. The tincture is given in leucorrhœa, gleet, and incontinence of urine, but ought only to be taken under the advice of an experienced physician.

The best antidotes are oil, Pulvis Cretæ c. Opio, both by the mouth and by injection.

**Chemistry.**—The active principle is *cantharidin*, $C_5H_6O_2$. It is a solid crystalline body, fusing to a yellow oil at 405° F., and capable of sublimation by heat. It is soluble in ether, acids, and alkalies; and although, *after isolation*, it is insoluble in water and spirit, it can yet be extracted by these menstrua from the flies themselves, owing, doubtless, to its being in some state of combination at present unknown. Its vapour is powerfully irritant, and 1-100th of a grain will distinctly blister the skin.

**Acetum Cantharidis.**

| | |
|---|---|
| Cantharides, in powder ................ | 2 ounces |
| Glacial Acetic Acid.................... | 2 fluid ounces |
| Acetic Acid ......................... | 18 fluid ounces |

Mix 13 ounces of the acetic acid with the glacial acid and Cantharides; digest at 200° F. for two hours, then percolate; lastly, pass the remaining acetic acid through it, press the contents, and filter.

Product, 1 pint.

(1 part of Cantharides in 10 parts.)

### Charta Epispastica. (Blistering Paper.)

| | |
|---|---|
| White Wax | 4 ounces |
| Spermaceti | 1½ ounce |
| Olive Oil | 2 fluid ounces |
| Resin | ⅝ ounce |
| Canada Balsam | ½ ounce |
| Cantharides, in powder | 1 ounce |
| Distilled Water | 6 fluid ounces |

Digest all the ingredients, excepting the Canada balsam in a water-bath for 2 hours, stirring constantly, then strain. Mix the balsam with the plaster in a shallow vessel and pass strips of paper over the surface of the hot liquid, so as to receive a thin coating of the plaster.

### Emplastrum Calefaciens.

| | |
|---|---|
| Cantharides, in coarse powder | 4 ounces |
| Boiling Water | 20 fluid ounces |
| Expressed Oil of Nutmeg | 4 ounces |
| Yellow Wax | 4 ounces |
| Resin | 4 ounces |
| Soap Plaster | 52 ounces |
| Resin Plaster | 32 ounces |

### Emplastrum Cantharidis.

| | |
|---|---|
| Cantharides, in fine powder | 12 ounces |
| Yellow Wax | 7½ ounces |
| Prepared Suet | 7½ ounces |
| Resin | 3 ounces |
| Lard | 6 ounces |

**Liquor Epispasticus.**

| | |
|---|---|
| Cantharides, in powder ................ | 8 ounces |
| Acetic Acid ........................... | 4 fluid ounces |
| Ether ............................ad. | 20 fluid ounces |

(1 part of Cantharides in 2½ parts.)

Macerate the Cantharides in the acid 24 hours, then percolate with the ether.

**Tinctura Cantharidis.**

| | |
|---|---|
| Cantharides, in coarse powder.......... | ¼ ounce |
| Proof Spirit.......................ad. | 20 fluid ounces |

Macerate 7 days, strain, press, and filter.

Dose—5 to 20 minims.

*Antidotes*—Emetics, demulcent drinks, and opiates.

**Unguentum Cantharidis.**

| | |
|---|---|
| Cantharides ........................... | 1 ounce |
| Yellow Wax............................ | 1 ounce |
| Olive Oil ............................. | 6 fluid ounces |

Infuse the Cantharides in the oil, in a covered vessel for 12 hours, then place the vessel in boiling water for 15 minutes, strain through muslin with strong pressure, add the product to the wax previously melted, and stir constantly while it cools.

## SUB-KINGDOM V.—MOLLUSCA.

*Not of importance to Materia Medica.*

# SUB-KINGDOM VI.—VERTEBRATA.

The principal portion of the nervous system is dorsal, and is completely shut off from the hæmal system; all possess a vertebral column. The limbs are never more than four in number.

Vertebrata are divided by Professor Huxley into three primary sections.

## DIVISION I.—ICTHYOPSIDA.

(ἰχθύς a fish; ὄψις appearance.)

### CLASS.—PISCES.

Provided with gills throughout the whole of their life. The heart consists of a single auricle and a single ventricle. The limbs are expansions of the integument or fins.

## ORDER.—TELEOSTEI.

(τέλειος perfect; ὀστέον a bone.)

## SUB-ORDER.—ANACANTHINI.

(α privative; ἀκάνθινος spiny.)

**OLEUM MORRHUÆ, Oleum Jecoris aselli,** *Cod-Liver Oil.*—The oil extracted from the fresh liver of the cod *Gadus Morrhua*, by the application of a heat not exceeding 180° F.

**Description.**—Pale yellow, with a slight fishy odour and taste and a slightly acid reaction. Sp. gr. ·928. A few drops of the oil treated on a slab with a drop of strong sulphuric acid, become first violet and then reddish brown. This test is due to cholic acid, one of the constituents of bile, and is common to all liver oils.

**Uses.**—Nutritive, being a fat which is more easily digested and assimilated than usual. Given in phthisis and wasting diseases generally.

**Chemistry.**—The analysis of cod liver oil, according to De Jongh, is, olein, 80·00; palmitin, 15·00; acetin, traces; butyric acid, traces; iodine, ·37; bromine and chlorine, ·15; phosphorus, ·02; cholic acid, traces; salts, 4·46; total, 100·00.

Winkler states that the fats of this oil are not true glycerides, but are salts of *propyl* $C_3H_7$, and yield *propyl hydrate* $C_3H_7HO$, instead of glycerin.

It is certain that by distilling the oil with potassium hydrate and ammonium chloride, we obtain *propylamine* $NH_2C_3H_7$, which is a colourless oily liquid, having a strong odour of herring.

**Varieties.**—The commercial oils are known as pale, light brown, and dark brown. The pale only is official.

**ICHTHYOCOLLA, Isinglass.**—The swimming-bladder or sound of various species of sturgeon, *Acipenser*, prepared, cut into shreds, and dried.

**Chemistry.**—The best Russian isinglass contains 98 per cent. of *gelatin*, which is an albuminous body containing carbon, 50·1; hydrogen, 6·6; nitrogen, 18·3; sulphur, ·14; and the rest oxygen. It is insoluble in alcohol and ether and when steeped in cold water, swells and dissolves on the application of heat, but sets to a jelly on cooling. It is not affected by dilute acids except tannic acid, which precipitates it from its aqueous solution in the form of finely-divided leather. (It is due to this action that tannic acid turns hides into leather by the process called tanning.) By long boiling with water the solutions of gelatin lose their property of congealing when cold.

**Gelatin, Solution of**

| | |
|---|---|
| Isinglass, in shreds.................... | 50 grains |
| Warm Distilled Water ................ | 5 fluid ounces |

*Use.*—To distinguish gallic from tannic acid, the latter only giving a yellowish white precipitate.

## DIVISION II.—SAUROPSIDA.

(*σαῦρα*, lizard; *ὄψις*, appearance.)

### CLASS.—AVES.

Circulation double, blood warm. The tarsal and metatarsal bones anchylosed. Covered externally with feathers.

# ORDER.—CARINATÆ.

## SUB-ORDER.—RASORES, OR SCRATCHERS.

**ALBUMEN OVI, White of Egg.**—The white of the egg of the common fowl, *Gallus Bankiva* var. *domestica*.

**Uses.**—Demulcent, and a good antidote for poisoning by any corrosive metallic salt.

**Chemistry.**—It consists of water, 85; albumen, 12; mucus, 2·7; salts, ·3. The *albumen* of egg differs from that of the serum of blood by being coagulable by ether. Its formula is $C_{72}H_{110}N_{18}SO_{22}.H_2O$. It is soluble in cold water, but coagulable on boiling or on the addition of a few drops of nitric acid, but with excess of this acid it dissolves, forming a pinkish solution. Solution of white of egg may be precipitated by salts of lead, mercury, silver, and copper; the precipitate with the latter being soluble in excess. It is not precipitated by acetic acid (distinction from *casein* of milk), but is thrown down by potassium ferrocyanide in the presence of acetic acid (distinction from gelatin).

**Albumen, Solution of**

The white of one Egg.

| | |
|---|---|
| Distilled Water | 4 fluid ounces |

(This must be recently prepared.)

*Use.*—To distinguish the glacial from the B.P. phosphoric acids: giving a precipitate with the former, but not with the latter.

**VITELLUS OVI, Yolk of Egg.**—The yolk contained in a delicate sac called the vitelline membrane of the egg of *Gallus Bankiva* var. *domestica.*

**Uses.** — Highly nutritive, and of great use in pharmacy for making emulsions.

**Chemistry.**—A natural emulsion containing 28 per cent. of a yellow oil suspended in water by the aid of 17·5 per cent. of albuminous matter containing phosphorus.

**Mistura Spiritus Vini Gallici.**

| | |
|---|---|
| Spirit of French Wine | 4 fluid ounces |
| Cinnamon Water | 4 fluid ounces |
| Yolks of Eggs | 2 |
| Refined Sugar | ½ ounce |

Dose—1 to 2 ounces.

# DIVISION III.—MAMMALIA.

The skull articulates to the vertebral column by two occipital condyles. The blood corpuscles are not nucleated. The young are nourished during a portion of their existence by milk, a secretion of the mammary glands.

## ORDER.—CETACEA.

**CETACEUM (B.P.), SPERMACETI.**—Nearly pure *cetin* obtained, mixed with oil, from the head of the sperm whale *Physeter macrocephalus*, inhabiting the Pacific and Indian Oceans.

**Collection.**—After removal from the head it is freed from oil by filtration and pressure, and afterwards purified by melting.

**Description.**—A white glistening crystalline fat, sp. gr. ·940, reducible to powder by rubbing with a little rectified spirit. It melts at 120° F., and is insoluble in cold, but entirely dissolved by boiling alcohol.

**Chemistry.**—The cetin of spermaceti is not a true glyceride like most other saponifiable fats, but is *Cetyl palmitate* $C_{16}H_{33}.C_{16}H_{31}O_2$, and yields when boiled with alkalies a palmitate of the alkali used, and *Cetyl hydrate*, $C_{16}H_{33}.HO$, commonly called *ethal*, instead of glycerin. Ethal is an alcohol homologous with ordinary alcohol. It is volatile by heat and by oxidation, and yields palmitic acid just as common alcohol yields acetic acid.

**Unguentum Cetacei.**

| | |
|---|---|
| Spermaceti | 5 ounces |
| White Wax | 2 ounces |
| Almond Oil | 20 fluid ounces |

Spermaceti is an ingredient in Charta Epispastica.

## ORDER.—UNGULATA.

(*Or* HOOFED QUADRUPEDS.)

This important division of Mammalia includes three entire old orders, Pachydermata, Solidungula, and Ruminantia.

### SUB-ORDER.—ARTIODACTYLA.

(ἄϐτιος, even; δάκτυλος, a toe.)

The toes even in number, two or four.

**ADEPS PRÆPARATUS, Prepared Lard.**—The purified internal abdominal fat of the pig *Sus scrofa*, belonging to the old order **Pachydermata** (παχὺς, thick; δέρμα, the skin.)

**Purification.**—Remove as much of the membranes as possible from the internal fat of the abdomen of the pig perfectly fresh. Cut the fat into small pieces, put it into a suitable vessel with about four gallons of *cold water*, and, while a current of water is running through the vessel, break up the masses of the fat with the hands, exposing every part to the water, so that whatever is soluble may be thus dissolved and carried away. Afterwards collect the washed fat on a sieve or in a cloth, drain away the water, liquefy the fat at a heat not exceeding 212°, and strain through flannel, pressing the residue while hot; then put it into a pan heated by steam, and keep it a temperature a little, but not much, above 212°, stirring it constantly until it becomes clear and entirely free from water. Finally, strain it through flannel.

**Chemistry.**—A pure white fat, without odour, melting about 100° F., and entirely soluble in ether. Stated in the books to be a mixture of 62 per cent.

*glyceryl oleate* (olein), $C_3H_58C_{18}H_{33}O_2$, with palmitin and stearin; but the author, in his researches into lard, has found that these proportions are neither accurate nor constant, and that, in fact, they vary with the age and sex of the animal. Water which has been boiled with lard should not precipitate argentic nitrate (absence of salt), nor turn blue with solution of iodine (absence of starch).

Prepared lard is contained in the following ointments:—Aconitiæ, Atropiæ, Belladonnæ, Hydrargyri, Hydrargyri Nitratis, Hydrargyri Subchloridi, Iodidi, Potassæ Sulphuratæ, Potassii Iodidi, Sabinæ, Simplex, Sulphuris Iodidi, Terebinthinæ, and Veratriæ.

**Adeps Benzoatus.** (*Vide* BENZOIN, page 249.)

| | |
|---|---|
| Prepared Lard ........................ | 16 ounces |
| Benzoin, in coarse powder ............ | 160 grains |

Heat in a water bath for two hours, stir frequently, and strain. (About 10 grains to 1 ounce.)

Benzoated lard is contained in Suppositoria Acidi Tannici, Suppositoria Hydrargyri, Suppositoria Morphiæ, Suppositoria Plumbi Composita, Unguentum Gallæ, Unguentum Gallæ c. Opio, Unguentum Plumbi Acetatis, Unguentum Sulphuris, and Unguentum Zinci.

**PEPSIN** (B.P.).—A preparation of the mucous lining of the fresh and healthy stomach of the pig, sheep, or calf.

**Preparation.**—The stomach of the recently killed animal having been cut open, and laid on a board with the inner surface upwards, any adhering portions of food, or other undissolved matter, are to be removed, and the exposed surface slightly washed with cold water; the cleansed mucous membrane is then scraped with a blunt knife or other suitable instrument, and the viscid pulp thus obtained is to be immediately spread over the surface of glass or glazed earthenware, and quickly dried at a temperature not exceeding 100°. The dried residue is to be reduced to powder, and preserved in a stoppered bottle.

**Characters and Tests.**—A light yellowish brown powder, having a faint but not disagreeable odour, and a slightly saline taste, without any indication of putrescence. Very little soluble in water or spirit. Two grains with 1 ounce of water, to which 5 minims of hydrochloric acid have been added, form a mixture in which 100 grains of hard boiled white of egg in thin shavings will dissolve on their being digested together for about 4 hours at 98° F.

This is caused by the power which the pepsin has of converting albuminous bodies into *peptone* in presence of a dilute acid.

**LAC, Milk.**—A natural emulsion of fat (butter) in a very weak solution of sugar by the aid of albuminous matter (casein), and containing a small proportion of mineral matter, chiefly chlorides and phosphates. Average cow's milk may be thus represented:—Water, 87·5; fat, 3·2; sugar, 5·0; casein, 3·6; ash, ·7; total, 100·00.

Owing, however, to the fact that cows yield a greater or less quantity of fat according to the nature of their food, analysts generally have agreed that the lowest limit of any sample of mixed milk should be fat, 2·5; solids not fat, 9·0; total solids, 11·5; ash, ·65.

To ascertain these points, about 50 grains of the milk should be evaporated to dryness in a weighed platinum dish by means of a water-bath, and the perfectly dry residue weighed. Ether should then be poured on the residue, boiled, and poured off, and this having been repeated until all the fat is extracted, the ether should be evaporated to dryness in a small weighed beaker, and the residual fat weighed. By deducting this from the total solids, the difference gives "solids not fat," or, in other words, sugar, casein, and mineral matter. The portion remaining in the platinum dish insoluble in ether should then be ignited at a gentle heat, and the ash weighed. The calculation to obtain the amount of pure milk in the sample is

$$\frac{100 \times \text{solids not fat}}{9} = \text{per-centage of pure milk.}$$

The butter of cow's milk is peculiar in containing besides the ordinary glycerides, such as olein, stearin, &c., a considerable per-centage of the glycerides of butyric, caproic, and caprylic acids. When, therefore, 50 grains of pure butter fat, separated from casein, &c., by melting till it becomes clear, and filtering, are saponified by alcoholic solution of potassium hydrate, the solution diluted, and the fatty acids thrown up by adding excess of hydrochloric acid, only the oleic, stearic, and palmitic acids float to the surface, while the butyric, caproic, and caprylic acids remain in solution. The insoluble acids, when washed with boiling water, dried, and weighed, should not exceed 89 per cent. as the utmost limit. (For further information as to the taking of the "actual density" and soluble acids, see the author's paper in the "*Analyst,*" No. 13, for April, 1877.)

**SACCHARUM LACTIS,** ***Sugar of Milk,*** $C_{12}H_{22}O_{11}.H_2O$. A crystallised sugar, obtained from the whey of milk by evaporation. Usually in cylindrical masses, 2 inches in diameter with a cord in the axis. Greyish white and crystalline on the surface and in its texture; gritty when chewed and slightly sweet. Less soluble in water than common sugar; slightly soluble in alcohol, and yields mucic acid by the action of nitric acid. It forms a sort of connecting link between gums and sugars.

**Uses.**—To dilute stronger medicines, and as a means of giving them in the state of powder.

**FEL BOVINUM PURIFICATUM B.P., Purified Ox Bile.**—The purified gall of the ox, ***Bos Taurus,*** belonging to the old order **Ruminantia.**

**Uses.**—In habitual constipation and in morbid states of the liver involving defective secretion.

**Chemistry.**—Bile is the fluid secreted by the liver of all mammalia. It is practically a solution of a natural soap formed by glycocholic and taurocholic acids in combination with sodium. Both these acids are conjugate bodies, the glycocholic having a formula of $C_{26}H_{43}NO_6$, and being built up of cholic acid, $HC_{24}H_{39}O_5.H_2O$, and glycocin, $C_2H_5NO_2$. It is soluble in alcohol and ether, but only slightly in water. The taurocholic acid has the composition $C_{26}H_{45}NO_7S$, and is produced by the union of cholic acid with *taurin* $C_2H_7NO_3S$.

The official extract is yellowish green, soluble in water and spirit, but insoluble in ether. Its watery solution, mixed with a drop of syrup and then sulphuric acid added until the precipitate first formed is redissolved, becomes first cherry-red, then carmine, purple, and finally violet. This is a test for the presence of cholic acid, and works with any solution of bile.

**Fel Bovinum Purificatum.**

| | |
|---|---|
| Fresh Ox Bile ........................ | 20 fluid ounces |
| Rectified Spirit ...................... | 40 fluid ounces |

Mix and set aside for 12 hours, decant and evaporate to an extract.

DOSE—5 to 10 grains, in pills, coated with an etherial tincture of tolu.

**MOSCHUS** (B.P.), **Musk.**—The inspissated and dried secretions from the preputial follicles of the *Moschus moschiferus*, or Musk Deer, belonging to the old order **Ruminantia.** Imported from China and Japan.

**Description.** — In small reddish black grains, unctuous in appearance, and contained in a round or slightly oval membranous sac, about 2 inches in diameter, curved on the outer side with stiff greyish hairs surrounding its central orifice. Each sac weighs about ¾ of an ounce, and contains about 160 grains weight of musk.

**Varieties.**—1. Chinese, which is the official musk. 2. Russian or Siberian, in longer grains, but inferior.

**Uses.** — Stimulant, anti-spasmodic, and reputed aphrodisaic.

**Chemistry.**—The odorous principle of musk is volatile, but has not been yet satisfactorily investigated.

**Substitute.**—Chinese musk, made up of dried blood with a little ammonia and a few true musk grains, sewed up in a piece of the skin of the musk ox.

**SEVUM PRÆPARATUM, Prepared Suet.** — The internal abdominal fat of the sheep, *Ovis aries*, purified by melting and straining.

**Description.**—White, smooth, greasy, and fusible at 103° F. Entirely soluble in ether, but crystallising out on the addition of a little rectified spirit.

**Chemistry.**—Is nearly all glyceryl stearate (stearin), $C_3H_5.3C_{18}H_{35}O_2$, with a little olein and palmitin. Saponified by alcoholic potash, and the solution diluted and acidulated with hydrochloric acid, 95 per cent. of fatty acids separate, which solidify on cooling, and consist chiefly of stearic acid.

Prepared suet is used in making *Sapo animalis*, which is chiefly sodium stearate and is a constituent of Emplastrum Cantharidis and Unguentum Hydrargyri.

## ORDER.—RODENTIA.

**CASTOREUM, Castor.**—The dried preputial follicles of *Castor fiber* (the Beaver), separated from the somewhat shorter and smaller oil sacs which are frequently attached to them. From Hudson's Bay Territory.

**Source.**—The beaver is peculiar in possessing as an appendage to its prepuce a pair of sacs of a pear-like shape, and about 3 inches long. They are found both in the male and female, and are situated under the skin in a hollow space between the cloaca and the pubic arch, into which both the organs of generation and the rectum open. They must not be confused with the testicles, having no connection therewith.

**Description.** — In pairs about 3 inches long, and in appearance something like a large and very dark-coloured fig, but much heavier.

**Chemistry.**—The secretion contained in the sacs is really orange-yellow during life, but in the dried article it is brown and almost entirely soluble both in alcohol and ether. It contains a volatile oil, an amorphous, dark brown, bitter and acrid resin, and a crystalline fat called *castorin*, soluble in ether. This fatty body resembles cholesterin, and is not susceptible of saponification. Wöhler has found that the volatile oil contains both carbolic and salicylic acids.

**Uses.** — Reputed anti-spasmodic, and used like asafœtida in hysteria. It has been also stated to possess emmenagogue properties.

**Tinctura Castorei.**

| | |
|---|---|
| Castor, in coarse powder .............. | 1 ounce |
| Rectified Spirit .....................ad. | 20 fluid ounces |

Macerate and strain.

Dose—½ to 1 fluid drachm.

# APPENDICES.

I.—A CLASSIFICATION AND DESCRIPTION OF THE CHIEF STARCHES EXISTING IN THE COMMONER ARTICLES OF MATERIA MEDICA AND FOOD.

II.—MUSEUM CABINET.—DRAWERS FOR THE RECOGNITION OF MATERIA MEDICA SPECIMENS.

III.—THE LEMON AND LEMON JUICE.

# APPENDIX I.

## A Classification and Description of the Chief Starches existing in the Commoner Articles of Materia Medica and Food.

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*The following Classification, first made public by me in the "*ANALYST*" for December,* 1876, *is the one which I have for some years adopted in teaching Microscopic Analysis. The whole of the matter contained in these explanatory Notes depends for its correct application on the use of the* 4-10*th-inch power and "B" eye-piece.*

## SAMPLING, MOUNTING, AND OBSERVING.

The best way of obtaining a fair sample of the starch is to mix it thoroughly in a mortar, and then take a clean and dry glass rod and with it stir the whole well up.

Having now got the slide ready, the rod is withdrawn from the starch, and touched sharply on the glass. By this means a sufficient number of granules will detach themselves and fall upon the slide. A drop of distilled water having been added, the covering-glass put on, and superfluous moisture removed with a slip of blotting paper, all is ready. It should be noted that the less the number of granules transferred to the slide the better; indeed, after mounting, the film of starch should just be visible to the eye as a thin milky cloud.

The next point to be considered is the power suitable for use; and here I must say that many of the common errors are induced by the tendency to employ too high an objective at the first observation. The most satisfactory power for general use by commercial or food analysts is a 4-10th-inch objective, and a "B" micrometer eye-piece. This will show any starch with sufficient distinctness, and will not unduly magnify. Anyone not having this power should certainly provide himself with one if he wants to work accurately and comfortably.

A very important matter in the examination of starches is the arrangement of light, which should *never* *be direct, but always somewhat oblique.* Great advantages will be apparent by changing the direction of the light now and then during the examination of a field; indeed, I am of opinion that the first thing which distinguishes the true microscopist is the judicious handling of his mirror, by which almost any effect can be attained. When polarising effects are wanted I always mount in water, using a blue selenite plate beneath the object; and the descriptions given hereafter of the behaviour of the starches in polarised light are dependent on these conditions. As a rule, the flat starches polarise better than the convex ones, and angular granules do not show any marked effects at all.

The points to be observed in looking at a starch are—

1. The shape.
2. The position and nature of the *hilum*.
3. The concentric rings.

The two first observations are simple, but the examination for rings requires care. The usual idea produced in the mind of anyone from observation of the ordinary woodcut drawings is that nearly all starches are covered with distinct rings. In practice with the 4-10th power this delusion is soon dissipated, as, even in the larger starches, the rings can only be caught by altering the focus continually with the fine adjustment, and keeping the eye, while doing so, on certain of the bolder granules. There are only really two starches which can be honestly presented as showing highly-marked rings on nearly every granule with an ordinary microscope, namely, turmeric and Natal arrowroot. It is very rarely that we find more than three or four granules, in a field of potato, for example, so equal in size as to show rings at the same focus. The oblique arrangement of the light is an absolute necessity in examining for rings; and it is here that a slight alteration of light during observation, as already recommended, tells wonderfully. There are several starches (wheat, for example) which show no rings, even in the best light. When the hilum is anywhere near the centre of the granules, the rings are seen all round it; but when it is near one end, only a segment of each ring is seen. For the purpose of brevity, I will call the former *complete*, and the latter *incomplete*, rings.

## MOUNTING STARCHES FOR PRESERVATION.

After trying numerous systems, I have finally arrived at the conclusion that starch retains its characters longest by being simply mounted in glycerin one part, and camphor water two parts. After removing superfluous moisture carefully, I surround the covering-glass edge with a good layer of blue mounting varnish by means of a turn-table. The varnish can be obtained from the usual dealers in microscopic apparatus.

## MEASUREMENTS OF STARCHES.

The *measurements* of starches are most important, and are performed in the usual manner by first comparing a stage micrometer, graduated in ·01 of an inch, with the divisions on a "B" micrometer eye-piece. By a careful study of the relation of the lines on the stage and in the eye-piece the exact value of each division of the latter with the 4-10th power is ascertained, and it is not then necessary to calculate each starch to fractions of an inch, but simply to note the number of divisions of the eye-piece which the image of the granule covers. A very little practice with the stage and eye micrometer will enable the drawing up of a special table for the eye-picee of one's own microscope, which is a most essential point in calculating the per-centages of mixtures of starches otherwise alike in general appearances. Every food analyst should have such a table of values of his eye-piece divisions always ready for reference.

In measuring I have used the English inch, as a more familiar standard to most persons, than the French millimetre. For example, in measuring with my eye-piece, I find that ·01 of an inch equals 27 main divisions. Each main division of the eye-piece, therefore, represents ·00037 of an inch. Suppose now we find that the largest granule of arrowroot in a field covers 6 main divisions, we have ·00037 × 6 = ·00222 of an inch for the largest size of arrowroot. In measuring any starches, such as rice and pepper, which run less in size than one division with the 4-10th power, it is necessary to use a higher power, say 1-5th or 1-8th. The divisions will now probably run 50 to the ·01, and each division with this power will show only ·00002 of an inch, which will enable the measurement to be made more accurately, a great point in distinguishing rice from pepper.

## CLASSIFICATION OF THE STARCHES.

There is no possibility of making any classification of starches based upon the natural orders, and therefore I have adopted a purely empirical one, based on the three points of observation already mentioned. It will be found of the greatest use in practice as at once reducing the starch under observation to being one of a certain few, and this narrowing of the ground being gained, then the more minute points have to be considered for final identification. It is to be distinctly understood that the characters are those of the *majority* of the granules in any one field.

The whole of the common starches may be classified into five characteristic groups as follows:—

### GROUP I.

The starches of this group are characterised by their more or less oval or ovate forms, and by their always having the *hilum*, and usually the *concentric rings*, clearly *visible*. The group includes tous les mois, potato, arrowroot, calumba, orris root, ginger, galangal, and turmeric.

## GROUP II.

Starches having the *concentric rings* all but *invisible*, and a very strongly marked *stellate hilum*. The group includes bean, pea, maize, lentil, dari, and nutmeg.

## GROUP III.

Starches having both the *concentric rings* and *hilum* invisible in the majority of the granules. The group includes wheat, barley, rye, jalap, rhubarb, senega, sumbul, bayberry, chestnut, acorn, calabar bean, liquorice root, white hellebore, green hellebore, and black hellebore.

## GROUP IV.

All the granules being more or less truncated at one end. The group includes sago, tapioca, belladonna, colchicum, scammony, podophyllum, canella, aconite, arum, cassia, and cinnamon.

## GROUP V.

Having all the granules angular in form. The group includes oats, tacca, rice, pepper, and ipecacuanha.

Having decided to which group the starch belongs, the following table will aid in its individual identification.

## Table for the Detection of Starches when magnified to about 225 diameters.

*All measurements are given in decimals of an inch.*

### GROUP I.—All more or less oval in shape, and having both *hilum* and *rings* visible.

| NAME. | SHAPE. | NORMAL MEASUREMENT. | REMARKS. |
|---|---|---|---|
| Tous les Mois | Oval, with flat ends | ·00370 to ·00185 | Hilum annular near one end, and incomplete rings. |
| Potato | Oval | ·00270 to ·00148 | Hilum annular, rings incomplete, shape and size very variable. |
| Bermuda Arrowroot | Sack-shaped | ·00148 to ·00129 | Hilum distinct annular, shape variable, rings faint. |
| St. Vincent Arrowroot | Oval-oblong | ·00148 to ·00129 | Hilum semilunar, rings faint, shape not very variable. |
| Natal Arrowroot | Broadly ovate | ·00148 to .00129 | Hilum annular in centre, and well marked complete rings. |
| Galangal | Skittle-shaped | About ·00135 | Hilum elongated, very faint incomplete rings. |
| Calumba | Broadly pear-shaped | „ ·00185 | Hilum semilunar, faint but complete rings, shape variable. |
| Orris Root | Elongated oblong | „ ·00092 | Hilum faint, shape characteristic. |
| Turmeric | Oval-oblong and conical | „ ·00148 | Very strongly marked incomplete rings. |
| Ginger | Shortly conical, with [rounded angles | „ ·00148 | Hilum and rings scarcely visible, shape variable but characteristic. |

## GROUP II.—With strongly developed *hilum*, more or less stellate.

| NAME. | SHAPE. | NORMAL MEASUREMENT. | REMARKS. |
|---|---|---|---|
| Bean | Oval-oblong | About ·00135 | Fairly uniform. |
| Pea | Like bean | ·00111 to ·00074 | Very variable in size, with granules under ·00111 preponderating. |
| Lentil | Like bean | About ·00111 | Hilum a long depression, seldom radiate. |
| Nutmeg | Rounded | „ ·00055 | The small size and rounded form distinctive. |
| Dari | Elongated hexagon | „ ·00074 | Irregular appearance and great convexity distinctive. |
| Maize | Round and polygonal | „ ·00074 | The rounded angles of the polygonal granules distinctive. |

## GROUP III.—*Hilum* and *rings* practically invisible.

| NAME. | SHAPE. | NORMAL MEASUREMENT. | REMARKS. |
|---|---|---|---|
| Wheat | Circular and flat | ·00185 to ·00009 | *Very variable* in size, and *very dull* polarisation in water. |
| Barley | *Slightly* angular circles. | ·00073, a few 4 times the size | The majority measuring about ·00073 distinctive. |
| Rye | Like barley | ·00148 to ·00009 | Small granules quite round, and here and there cracked. |
| Jalap | Like wheat | Like wheat | Polarises *brightly* in water. |
| Rhubarb | ” | ·00055 to ·00033 for smalls | Polarises between jalap and wheat, and runs smaller and more convex. |
| Senega | ” | ·00148 to ·00009 | Measurements the only guide. |
| Bayberry | ” | ·00074 to ·00011 | |
| Sumbul | ” | ·00066 to ·00009 | |
| Chestnut | Very variable | ·00090 to ·00009 | Variable form, and small but regular size distinctive. |
| Acorn | Round-oval | About ·00074 | Small and uniform size distinctive. |
| Calabar Bean | Oval-oblong | ·00296 to .00180 | Large size and shape characteristic. |
| Liquorice | Elongated oval | About ·00018 | Small size and shape distinctive. |
| Hellebore, green or black | Perfectly rotund | ·00037 to ·00009 | Small regular size and rotundity distinctive. |
| ” white | Irregular | ·00055 to ·00009 | Irregular shape and faint central depression distinctive. |

## GROUP IV.—More or less truncated at one end.

| NAME. | SHAPE. | NORMAL MEASUREMENT. | REMARKS. |
|---|---|---|---|
| Cassia .......... | Round .............. | ·00111 to ·00018 .... | Round and muller-shaped granules, and faint circular hilum. |
| Cinnamon ........ | Like cassia............ | ·00074 to ·00009 .... | More frequently truncated than cassia, and smaller. |
| Sago, raw ........ | Oval-ovate ............ | ·00260 to ·00111 .... | Has circular hilum at convex end, and rings faintly visible. |
| „ prepared .... | „ ............ | „ „ .... | Has a large oval or circular depression, covering ⅓ nearly of each granule. |
| Tapioca .......... | Roundish ............ | ·00074 to ·00055 .... | A little over 50 per cent. truncated by *one* facet and a pearly hilum. |
| Arum ............ | „ ............ | About ·00056 ........ | Smaller than tapioca, and truncated by *two* facets. |
| Belladonna ...... | „ ............ | .................... | Not distinguishable from tapioca. |
| Colchicum ........ | „ ............ | About ·00074 ........ | Larger than tapioca, and contains many more truncated granules. |
| Scammony........ | „ ............ | „ ·00045 ........ | Smaller than tapioca, more irregular, and hilum not visible. |
| Canella .......... | Very variable.......... | ·00033 to ·00022 .... | Very variable form and small size the only points. |
| Podophyllin ...... | Like tapioca .......... | About ·00040 ........ | Like scammony, but has visible hilum in most of the granules. |
| Aconite .......... | „ .......... | „ ·00037 ........ | Like tapioca, but half the size. |

## GROUP V.—All granules more or less polygonal.

| NAME. | SHAPE. | NORMAL MEASUREMENT. | REMARKS. |
|---|---|---|---|
| Tacca | Polygonal or hexagonal | ·00075 to ·00037 | Distinguished from maize by its *sharp* angles. |
| Oat | Polygonal | About ·00037 | Larger than rice, and hilum visible in some granules. |
| Rice | „ | ·00030 to ·00020 | Measurement using ⅛ or 1/12-inch power, and then hilum visible. |
| Pepper | „ | ·00020 to ·00002 | „ „ „ „ |
| Ipecacuanha | „ | About ·00018 | Some round and truncated granules adhering in groups of three. |

# APPENDIX II.—MUSEUM CABINET.

## DRAWERS FOR THE RECOGNITION

OF

## MATERIA MEDICA SPECIMENS,

ARRANGED FOR THE USE OF STUDENTS

AT

THE SOUTH-LONDON SCHOOL OF PHARMACY,

KENNINGTON.

STUDENTS HAVE ALSO FREE ACCESS TO THE GENERAL MUSEUMS
OF CHEMISTRY, BOTANY, AND MATERIA MEDICA.

1879.

## DRAWER A.

| NO. | NAME. | PART USED. | WHENCE OBTAINED. |
|---|---|---|---|
| 1 | Nux Vomica. | Seeds. | Strychnos Nux vomica. |
| 1 A | St. Ignatius' Beans. | Seeds. | Strychnos Ignatia. |
| 2 | Croton Seeds. | Oil. | Croton Tiglium. |
| 3 | Cocculus Indicus. | Fruit. | Anamirta Cocculus. |
| 4 | Bay Berries. | Fruit. | Laurus nobilis. |
| 5 | Coriander. | Fruit. | Coriandrum sativum. |
| 6 | Fœnugreek. | Seeds. | Trigonella Fœnum-graecum. |
| 7 | Colchicum. | Seeds. | Colchicum autumnale. |
| 8 | Stramonium. | Seeds. | Datura Stramonium. |
| 9 | Nutmegs. | Kernels. | Myristica officinalis. |
| 10 | Cubebs. | Fruit. | Cubeba officinalis. |
| 11 | White Pepper. | Ripe fruit. | Piper nigrum. |
| 12 | Black Pepper. | Unripe fruit. | Piper nigrum. |
| 13 | Dill. | Fruit. | Anethum graveolens. |
| 14 | Anise. | Fruit. | Pimpinella anisum. |
| 15 | Hemlock. | Fruit. | Conium maculatum. |
| 16 | Carrot. | Fruit. | Daucus Carota. |
| 17 | Fennel. | Fruit. | Fœniculum dulce. |
| 18 | Cumin. | Fruit. | Cuminum Cyminum. |

# DRAWER A.

| NATURAL ORDER. | HABITAT. | PREPARATIONS. | NO. |
|---|---|---|---|
| Loganiaceæ. | East Indies, [Coromandel. | Ext. Nucis vom. 1 from 16.<br>Liq. Strychniæ, 1 in 120.<br>Strychnia.<br>Tinct. Nucis vom. 1 in 10. | 1 |
| Loganiaceæ. | Philippine Islands. | Non-official. | 1 A |
| Euphorbiaceæ. | Ceylon. | Lin. Crotonis, 1 in 8. | 2 |
| Menispermaceæ. | Malabar. | Non-official. | 3 |
| Lauraceæ. | Southern Europe. | Non-official. | 4 |
| Umbelliferæ. | Cultivated in Britain. | Conf. Sennæ.<br>Mist. Gentianæ.<br>Syr. Rhei.<br>Tinct. Rhei.<br>Tinct. Sennæ.<br>*Ol.* Coriandri (Syr. Sennæ). | 5 |
| Leguminosæ. | Southern Europe, | Non-official. | 6 |
| Melanthaceæ. | Cultivated in Britain. | Tinct. Sem. Colchici, 1 in 8. | 7 |
| Atropaceæ. | Indigenous. | Ext. Stramon. 1 from 8.<br>Tinct. „ 1 in 8. | 8 |
| Myristicaceæ. | Banda Islands. | Pulv. Catechu Co.<br>Spirit, 1 volat. oil. in 50. | 9 |
| Piperaceæ. | Java. | Oleum Cubebæ.<br>Tinct. „ 1 in 8. | 10 |
| Piperaceæ. | Telicherry. | Non-official. | 11 |
| Piperaceæ. | East Indies. | Conf. Piper., 1 in 10. | 12 |
| Umbelliferæ. | Southern Europe. | Aqua Anethi, 1 in 10.<br>Oleum Anethi. | 13 |
| Umbelliferæ. | Asia Minor, cultivated in Southern Europe. | Ess. Anisi, 1 in 4. Sp. Rect.<br>Oleum Anisi. | 14 |
| Umbelliferæ. | Indigenous. | Tinct. Conii, 1 in 8. | 15 |
| Umbelliferæ. | Indigenous. | Non-official. | 16 |
| Umbelliferæ. | Malta. | Aqua Fœniculi, 1 in 10. | 17 |
| Umbelliferæ. | Malta and Sicily. | Non-official. | 18 |

## DRAWER B.

| NO. | NAME. | PART USED. | WHENCE OBTAINED. |
|---|---|---|---|
| 1 | Gamboge. | Gum-resin. | Garcinia Morella var. β. Pedicellata. |
| 2 | Guaiacum. | Resin. | Guaiacum officinale. |
| 3 | Camphor. | Concrete Volatile Oil. | Camphora officinarum. |
| 4 | Mastich. | Resin. | Pistacia Lentiscus. |
| 5 | Sandarach. | Resin. | Callitris Quadrivalvis. |
| 6 | Opium. | Inspissated Juice. | Papaver somniferum. |
| 7 | Burgundy Pitch. | Resinous exudation. | Abies excelsa. |
| 8 | Resin. | Resin. | Var. Spec. Pinus and Abies. |
| 9 | Thus. | Crude Turpentine. | Pinus Tœda and P. palustris. |
| 10 | Olibanum. | Gum-resin. | Var. Spec. Boswellia. |
| 11 | Benzoin. | Balsamic Resin. | Styrax Benzoin. |
| 12 | " | " | " |
| 13 | Barbadoes Aloes. | Inspissated Juice. | Aloe vulgaris. |
| 14 | Socotrine Aloes. | Inspissated Juice. | Aloe Socotrina. |
| 15 | Cape Aloes. | Inspissated Juice. | Aloe spicata. |
| 16 | Hepatic Aloes. | Inspissated Juice. | Aloe Socotrina. |
| 17 | Natal Aloes. | Inspissated Juice. | |
| 18 | Zanzibar Aloes. | | |

# DRAWER B.

| NATURAL ORDER. | HABITAT. | PREPARATIONS. |
|---|---|---|
| Guttiferæ. | Siam. | Pil. Cambogiæ Comp. 1 in 6. |
| Zygophyllaceæ. | San Domingo and [Jamaica. | Mist. Guaiaci, 1 in 40.<br>Pil. Hydrarg. Subchlor. Comp. 1 in 2½<br>Tinct. Guaiaci Ammoniat. 1 in 5. |
| Lauraceæ. | China and Japan. | Aqua Camph. ½ oz. to 1 gall.<br>Liniment, 1 in 5 nearly.<br>,, Comp. 1 in 8 nearly.<br>Spirit, 1 in 10 nearly.<br>Tinct. Camph. Comp. |
| Anacardiaceæ. | Scio. | No B.P. prep. |
| Coniferæ. | Northern Europe. | Non-official. Pounce. |
| Papaveraceæ. | Smyrna, Persia, Constantinople, Egypt, and India. | Opium Preparations. *Vide* final page. |
| Coniferæ. | Black Forest. | Emp. Picis, 1 in 2.<br>,, Ferri, 1 in 5½. |
| Coniferæ. | America. | Emp. Resinæ, 1 in 9½.<br>Ung. ,, 1 in 3½. |
| Coniferæ. | North America. | Emp. Picis. |
| Amyridaceæ. | Africa and Southern Arabia. | Non-official. |
| Styraceæ. | Siam and Sumatra. | Adeps Benzoatus, 10 grains to 1 oz. |
| ,, | ,, ,, | Acid. Benzoicum.<br>Tinct. Benzoin Co. 1 in 10. |
| Liliaceæ. | Barbadoes. | Enema Aloes, 4 grains to 1 ounce.<br>Ext. Aloes Barb. 8 from 10.<br>Pil. Aloes ,, 1 in 2.<br>,, ,, et Ferri, 1 in 5¼.<br>,, Cambogiæ Co. 1 in 6.<br>,, Colocynth Co. 1 in 3.<br>,, ,, et Hyos. 1 in 4½. |
| Liliaceæ. | Socotra. Imported [from Bombay. | Dec. Aloes Co. 4 grains (ext.) to 1 oz.<br>Enema Aloes, 4 grains to 1 ounce.<br>Ext. Aloes Socot. 1 from 2.<br>,, Coloc. Co. 1 (ext.) in 2¼.<br>Pil. Aloes et Asafœtidæ, 1 in 4.<br>,, ,, et Myrrhæ, 1 in 3.<br>,, ,, Socot. 1 in 2.<br>,, Rhei Co. 1 in 6.<br>Tinct. Aloes, 1 in 40.<br>,, Benzoin Co. 8 grains to 1 oz<br>Vin. Aloes, 16½ grains to 1 ounce. |
| Liliaceæ. | Cape of Good Hope. | |
| Liliaceæ. | Imported from Bombay. | *Vide* Supra. |
| Liliaceæ. | Natal. | Nataloin. |
| Liliaceæ. | | |

# DRAWER C.

| NO. | NAME. | PART USED. | WHENCE OBTAINED. |
|---|---|---|---|
| 1 | Yellow Wax. | Prepared Honeycomb. | Apis mellifica. |
| 2 | White Wax. | Bleached. | ,, |
| 3 | Spermaceti. | Concrete Oil. | Physeter macrocephalus. |
| 4 | Cochineal. | Dried insect. | Coccus Cacti. |
| 5 | Sugar of Milk. | | |
| 6 | Cantharides. | Beetle. | Cantharis vesicatoria. |
| 7 | Asafœtida. | Gum-resin. | Narthex Asafœtida. |
| 8 | Kino. | Inspissated Juice. | Pterocarpus Marsupium. |
| 9 | Ammoniacum. | Gum-resin. | Dorema Ammoniacum. |
| 10 | Pale Catechu. | Extract. | Uncaria Gambier. |
| 11 | Black Catechu. | Extract. | Acacia Catechu. |
| 12 | Scammonium. | Gum-resin. | Convolvulus Scammonia. |
| 13 | Scammony Resin. | Resin. | Convolvulus Scammonia. |
| 14 | Jalap Resin. | Resin. | Exogonium Purga. |
| 15 | Bdellium. | Gum-resin. | Balsamodendron Mukul, B. pubescens. |
| 16 | Myrrh. | Gum-resin. | Balsamodendron Myrrha. |
| 17 | Acacia. | Gum. | Acacia vera. |
| 18 | Tragacanth. | Gum. | Astragalus verus. |

## DRAWER C.

| NATURAL ORDER. | HABITAT. | PREPARATIONS. | NO. |
|---|---|---|---|
| Hymenoptera. | Everywhere. | Ung. Resinæ, &c. | 1 |
| ,, | ,, | Ung. Simplex, &c. | 2 |
| Cetacea. | Pacific and Indian Oceans. | Ung. Cetacei, &c. | 3 |
| Hemiptera. | Mexico and Teneriffe. | Tinct. Cocci, 1 in 8, &c. | 4 |
|  | Switzerland. |  | 5 |
| Coleoptera. | Hungary and Russia. | Acet. Canthar. 1 in 10.<br>Charta Epispastica.<br>Emplast. 1 in 3.<br>Emp. Calefaciens, 1 in 25.<br>Liquor Epispasticus, 1 in 2½.<br>Tinct. Canthar. 1 in 80.<br>Ung. ,, 1 in 8. | 6 |
| Umbelliferæ | Affghanistan and Punjaub. | Enema Asafœtidæ, 30 grs. to 4 oz.<br>Pil. ,, Co. 1 in 3½.<br>,, Aloes et Asafœtidæ, 1 in 4.<br>Spt. Ammon. fœtid, 1 in 13⅓.<br>Tinct. Asafœtidæ, 1 in 8. | 7 |
| Leguminosæ. | Malabar. | Pulv. Catechu Co. 1 in 5.<br>,, Kino Co. 3¾ in 5.<br>Tinct. Kino, 1 in 10. | 8 |
| Umbelliferæ. | Persia and Punjaub. | Emp. Ammon. c. Hyd. 12 in 15.<br>,, Galbani, 1 in 11.<br>Mist. Ammon. 1 in 32.<br>Pil. Ipecac. c. Scillâ, 1 in 7.<br>,, Scillæ Co. 1 in 6. | 9 |
| Cinchonaceæ. | Singapore. | Inf. Catechu, 1 in 30.<br>Pulv. ,, Co. 1 in 2½.<br>Tinct. ,, 1 in 8.<br>Troch. ,, 1 gr. in each. | 10 |
| Leguminosæ. | Pegu. | Non-official. | 11 |
| Convolvulaceæ. | Syria and Asia Minor | Conf. Scam. 1 in 3.<br>Pil. Coloc. Co. 1 in 3.<br>,, et Hyos. 1 in 4½.<br>Pulv. Scam. Co. 1 in 2. | 12 |
| Convolvulaceæ. | Prepared in Britain. | Ext. Coloc. Co. 1 in 7.<br>Mist. Scam. 4 grs. to 2 oz.<br>Pil.. ,, Co. 1 in 3. | 13 |
| Convolvulaceæ. | Prepared in Britain. | Pil. Scam. Co. 1 in 3. | 14 |
| Amyridaceæ. | Scinde. | Non-official. | 15 |
| Amyridaceæ. | Arabia Felix and Abyssinia. | Dec. Aloes Comp. 3 grs. to 1 oz.<br>Mist. Ferri Comp. 6 grs. to 1 oz.<br>Pil. Aloes et Myrrh, 1 in 6.<br>Pil. Asafœtid. Comp. 1 in 3½.<br>Pil. Rhei Comp. 1 in 8.<br>Tinct. Myrrh, 1 in 8. | 16 |
| Leguminosæ. | Eastern Africa. | Mucil. Acaciæ, 4 and 6, &c. | 17 |
| Leguminosæ. | Asia Minor. | Conf. Opii, 1 in 120.<br>Mucilag. Tragac. 1 in 80.<br>Pulv. Opii, Comp. 1 in 30.<br>,, Tragac. Comp. 1 in 6. | 18 |

## DRAWER D.

| NO. | NAME. | PART USED. | WHENCE OBTAINED. |
|---|---|---|---|
| 1 | Lobelia. | Flowering Herb. | Lobelia inflata. |
| 2 | Matico. | Leaves. | Artanthe elongata. |
| 3 | Senna (inferior). | Leaflets. | Cassia elongata |
| 4 | „ (very inferior). | Leaflets. | C. angustifolia. |
| 5 | „ (very good). | Leaflets. | C. elongata. |
| 6 | „ | Leaflets. | C. lanceolata and obovata. |
| 7 | Cusso. | Flowering Tops. | Brayera anthelmintica. |
| 8 | Indian Hemp. | Female flowering tops. | Cannabis sativa (var. Indica.) |
| 9 | Aconite. | Leaves. | Aconitum napellus. |
| 10 | Henbane. | Leaves. | Hyoscyamus niger. |
| 11 | Belladonna. | Leaves. | Atropa Belladonna. |
| 12 | Digitalis. | Leaves. | Digitalis purpurea. |
| 13 | Hemlock. | Leaves. | Conium maculatum. |
| 14 | Chamomile. | Flower heads. | Anthemis nobilis. |
| 15 | Bearberry. | Leaves. | Arctostaphylos Uva Ursi. |
| 16 | Buchu. | Leaves. | Barosma betulina. |
| 17 | „ | Leaves. | B. crenulata. |
| 18 | „ | Leaves. | B. serratifolia. |

# DRAWER D.

| NATURAL ORDER. | HABITAT. | PREPARATIONS. | NO. |
|---|---|---|---|
| Lobeliaceæ. | North America. | Tinct. Lobeliæ, 1 in 8.<br>„ „ Æther, 1 in 8. | 1 |
| Piperaceæ. | Peru. | Inf. Maticæ, 1 in 20. | 2 |
| Leguminosæ. | East Indies. | Non-official. | 3 |
| „ | „ | „ | 4 |
| „ | Southern India. | May be used in place of Alex. | 5 |
| „ | Alexandria. | Conf. Sennæ, 1 in 11.<br>Inf. „ 1 in 10.<br>Mist. „ Co.<br>Pulv. Glycyr. Co., 1 in 5.<br>Syr. Sennæ, 1 in 2.<br>Tinct. „ 1 in 8. | 6 |
| Rosaceæ. | N.E. Abyssinia. | Inf. Cusso, 1 in 16. | 7 |
| Cannabinaceæ. | India. | Ext. Cannabis Ind.<br>Tinct. „ „ 1 Ext. in 20. | 8 |
| Ranunculaceæ. | Cultivated in Britain. | Ext. Aconiti, from fresh leaves and flowers. | 9 |
| Atropaceæ. | Indigenous. | Ext. from fresh leaves and young branches.<br>Succus.<br>Tinct. Hyos. 1 in 8. | 10 |
| Atropaceæ. | Indigenous. | Ext. from fresh leaves and young branches.<br>Emplast.<br>Succus.<br>Tinct. 1 in 20.<br>Unguent. | 11 |
| Scrophulariaceæ. | Indigenous. | Infus. Digital. 30 grains to 10 ounces.<br>Tinct. „ 1 in 8. | 12 |
| Umbelliferæ. | Indigenous. | Cataplasm Conii, 1 in 14.<br>Ext. „ fresh leaves and young branches.<br>Succus „<br>Pil. Conii Comp. 2½ in 3.<br>Vapor Coniæ. | 13 |
| Compositæ. | Indigenous. | Ext. Anthemidis.<br>Inf. „ 1 in 20.<br>Oleum „ | 14 |
| Ericaceæ. | Indigenous. | Inf. Uvæ Ursi, 1 in 20. | 15 |
| Rutaceæ. | Cape of Good Hope. | Inf. Buchu, 1 in 20.<br>Tinct. „ 1 in 8. | 16 |
| „ | „ | | 17 |
| „ | „ | | 18 |

## DRAWER E.

| NO. | NAME. | PART USED. | WHENCE OBTAINED. |
|---|---|---|---|
| 1 | Scammony. | Root. | Convolvulus Scammonia. |
| 2 | Rhubarb. | Root. | Rheum officinale. |
| 3 | " | Root. | " |
| 4 | " | Root. | " |
| 5 | " | Root. | Rheum Rhaponticum. |
| 6 | Rhatany. | Root. | Krameria triandra. |
| 7 | Belladonna. | Root. | Atropa Belladonna. |
| 8 | Gentian. | Root. | Gentiana lutea. |
| 9 | Dandelion. | Root. | Taraxacum Dens Leonis. |
| 10 | Pellitory. | Root. | Anacyclus Pyrethrum. |
| 11 | Aconite. | Root. | Aconitum Napellus. |
| 12 | Podophyllum. | Rhizome. | Podophyllum peltatum. |
| 13 | Pareira. | Root. | Chondodendron tomentosum. |
| 14 | Pareira. | Stem. | Cissampelos Pareira. |
| 15 | Ipecacuanha. | Root. | Cephaëlis Ipecacuanha. |
| 16 | Hemidesmus. | Root. | Hemidesmus Indicus. |
| 17 | Jalap (true). | Root. | Exogonium purga. |
| 18 | Jalap (false). | Root. | Ipomœa simulans. |

# DRAWER E.

| ATURAL ORDER. | HABITAT. | PREPARATIONS. |
|---|---|---|
| onvolvulaceæ. | Syria and Asia Minor. | Resin. |
| olygonaceæ. | Chinese Tartary and Thibet. | Ext. Rhei.<br>Inf. „ 1 in 40.<br>Pil. „ Co. 1 in 4.<br>Pulv. „ Co. 1 in 4½.<br>Syrup. Rhei.<br>Tinct. „ 1 in 10.<br>Vinum „ 1 in 13⅓. |
| „ | Imported from E.I. | |
| „ | " Batavian." | |
| „ | Oxfordshire. | Non-official. |
| olygalaceæ. | Peru. | Ext. Krameriæ.<br>Inf. „ 1 in 20.<br>Pulv. Catechu Co. 1 in 5.<br>Tinct. Krameriæ, 1 in 8. |
| tropaceæ. | Indigenous. | Atropia.<br>Liquor Unguentum.<br>Atropiæ Sulph. Liquor.<br>Lin. Bellad. 1 in 1. |
| entianaceæ. | Southern Europe. | Ext. Gent.<br>Inf. „ Co. 1 in 80.<br>Mist. „ 1 in 40.<br>Tinct. „ Co. 1 in 13⅓. |
| ompositæ. | Indigenous. | Decoct. Tarax. 1 in 20.<br>Ext. „ (fresh root).<br>„ „ Liq. „<br>Succus „ „ 3 in 4, &c. |
| ompositæ. | Spain and Levant. | Tinct. Pyrethri, 1 in 5. |
| anunculaceæ. | Southern Europe. | Aconitia.<br>Unguentum Aconitiæ, 1 gr. to ʒj.<br>Tincture, 1 in 8.<br>Liniment, 1 in 1. |
| anunculaceæ. | North America. | Podophylli Resina. |
| enispermaceæ. | Brazil. | Decoct. Pareiræ, 1 in 13⅓.<br>Ext. „<br>„ „ Liq. 1 in 1. |
| enispermaceæ. | Brazil. | Non-official. |
| inchonaceæ. | Brazil. | Pil. Conii Co. 1 in 6.<br>Pil. Ipecac. c. Scillâ, 1 in 23.<br>Pulv. Ipecac. Co. 1 in 10.<br>Troch. Ipecac. ¼ gr. in each.<br>Troch. Morph. c. Ipecac. 1/12 gr. in each.<br>Vin. Ipecac. 1 in 20. |
| sclepiadaceæ. | India. | Syrup. |
| onvolvulaceæ. | Vera Cruz. | Ext. Jalapæ.<br>Pulv. „ Co. 1 in 3.<br>„ Scam. Co. 1 in 3 nearly.<br>Resina Jalapæ.<br>Tinct. „ 1 in 8. |
| onvolvulaceæ. | Tampico. | Non-official. |

## DRAWER F.

| NO. | NAME. | PART USED. | WHENCE OBTAINED. |
|---|---|---|---|
| 1 | Oak Bark. | Bark of young branches | Quercus pedunculata. |
| 2 | Winter's Bark. | Bark. | Drimys Winteri. |
| 3 | Bebeeru. | Bark. | Nectandra Rodiæi. |
| 4 | Elm. | Bark. | Ulmus campestris. |
| 5 | Cusparia. | Bark. | Galipea Cusparia. |
| 6 | Canella. | Bark. | Canella alba. |
| 7 | Yellow Cinchona. | Bark. | Cinchona Calisaya. |
| 8 | Pale Cinchona. | Bark. | Cinchona officinalis, var Condaminea. |
| 9 | Red Cinchon | Bark. | Cinchona succiruba. |
| 10 | Lancifolia. | Bark. | Cinchona lancifolia. |
| 11 | Cascarilla. | Bark. | Croton Eluteria. |
| 12 | Simaruba. | Root bark. | Simaruba amara. |
| 13 | Cassia Pods. | Ripe fruit. | Cassia Fistula. |
| 14 | Horse Cassia. | Ripe fruit. | Cassia Brasiliana. |
| 15 | Nux Vomica. | Bark. | Strychnos Nux vomica. |
| 16 | Wild Cherry. | Bark. | Prunus serotina virginiana. |
| 17 | Pomegranate. | Root bark. | Punica Granatum. |
| 18 | Pomegranate. | Fruit bark. | Punica Granatum. |

## DRAWER F.

| NATURAL ORDER. | HABITAT. | PREPARATIONS. |
|---|---|---|
| Cupuliferæ. | Indigenous. | Dec. Quercus, 1 in 16. |
| Magnoliaceæ. | Straits of Magellan, South America. | Non-official. |
| Lauraceæ. | British Guiana. | Beberiæ Sulphas. |
| Ulmaceæ. | Indigenous. | Dec. Ulmi, 1 in 8. |
| Rutaceæ. | South America. | Inf. Cuspariæ, 1 in 20. |
| Canellaceæ. | West Indies. | Vin. Rhei, 60 grs. to 1 pint. |
| Cinchonaceæ. | Bolivia and Southern Peru. | Dec. Cinch. 1 in 16.<br>Ext. „ Liq. 1 from 4.<br>Inf. „ 1 in 20.<br>Quinæ Sulph. and various alkaloids.<br>Tinct. Cinch. 1 in 5. |
| Cinchonaceæ. | Loxa in Ecuador. | Mist. Ferri Arom. 1 in 16.<br>Tinct. Cinch. Co. 1 in 10. |
| Cinchonaceæ. | Western Slopes of Chimborazo. | No B.P. prep. |
| Cinchonaceæ. | New Granada. | Quiniæ Sulph. |
| Euphorbiaceæ. | Bahama Islands. | Inf. Cascarillæ, 1 in 10.<br>Tinct. „ 1 in 8. |
| Simarubaceæ. | Jamaica. | Non-official. |
| Leguminosæ. | East and West Indies. | Conf. Sennæ, 1 in 8. |
| Leguminosæ. | Central America. | Non-official. |
| Loganiaceæ. | Coromandel. | Non-official. |
| Rosaceæ. | North America. | Official in United States Phar. |
| Myrtaceæ. | Southern Europe. | Dec. Granati Rad. 1 in 10. |
| Myrtaceæ. | Southern Europe. | Non-official. |

## DRAWER G.

| NO. | NAME. | PART USED. | WHENCE OBTAINED. |
|---|---|---|---|
| 1 | Poppy Heads. | Capsules. | Papaver somniferum. |
| 2 & 3 | Galls. | Excrescences. | Quercus infectoria, formed by punctures and deposited ova of Diplolepis Gallæ tinctoriæ. |
| 4 | Capsicum. | Fruit | Capsicum fastigiatum. |
| 5 | White Mustard. | Seed. | Sinapsis alba. |
| 6 | Black Mustard. | Seed. | „ nigra. |
| 7 | Grains of Paradise. | Seed. | Amomum Melegueta. |
| 8 | Linseed. | Seed. | Linum usitatissimum. |
| 9 | Star Anise. | Fruit. | Illicium anisatum. |
| 10 | Pimento. | Berries. | Eugenia pimenta. |
| 11 | Ergot. | Sclerotium. | Claviceps purpurea. |
| 12 | Calabar Bean. | Seed. | Physostigma venenosum. |
| 13 | Stavesacre. | Seed. | Delphinium staphisagria. |
| 14 | Cevadilla. | Fruit. | Asagræa officinalis. |
| 15 | Areca Nat. | Seed. | Areca Catechu. |
| 16 | Cardamoms. | Fruit. | Elettaria Cardamomum. |
| 17 | Colocynth. | Fruit freed from seeds. | Citrullus Colocynthis. |
| 18 | Bael. | Fruit. | Ægle Marmelos. |

# DRAWER G.

| NATURAL ORDER. | HABITAT. | PREPARATIONS. | NO. |
|---|---|---|---|
| Papaveraceæ. | Cultivated in Britain. | Decoct. Papav. 1 in 10.<br>Ext. „<br>Syr. „ 1 in 3 nearly. | 1 |
| Cupuliferæ. | Mosul and Aleppo. | Tinct. Gallæ, 1 in 8.<br>Ung. „ 80 grs. to 1 oz.<br>„ „ c. Opio.<br>Acid Gallici.<br>„ Tannici. | 2 & 3 |
| Solanaceæ. | Zanzibar. | Tinct. Capsici, 1 in 26. | 4 |
| Cruciferæ. | Indigenous. | Cataplasma Sinapis.<br>Charta Sinapis.<br>Liniment Sinapis Comp. | 5 |
| Cruciferæ. | Indigenous. | Ol. Sinapis. | 6 |
| Zingiberaceæ. | West Coast of Africa. | Non-official. | 7 |
| Linaceæ. | Indigenous. | Cataplasma Lini.<br>Farina Lini.<br>Inf. Lini. 1 in 30.<br>Ol. Lini. | 8 |
| Magnoliaceæ. | China and Japan. | Ol. Anisi. | 9 |
| Myrtaceæ. | Jamaica. | Aq. Pimentæ, 1 in 11½. | 10 |
| Fungi. | Gallicia (chiefly). | Ext. Ergotæ Liq. 1 in 1.<br>Inf. „ 1 in 40.<br>Tinct. „ 1 in 4. | 11 |
| Leguminosæ. | Western Africa. | Ext. Physostigmatis. | 12 |
| Ranunculaceæ. | Southern Europe. | Non-official. | 13 |
| Melanthaceæ. | Mexican Andes. | Veratria.<br>Ung. Veratriæ, 8 grs. to 1 oz. | 14 |
| Palmaceæ. | Southern India. | No B.P. prep. | 15 |
| Zingiberaceæ. | Malabar. | Pulv. Cinnam. Co. 1 in 3.<br>Tinct. Cardam. Co. 1 in 80, &c. | 16 |
| Cucurbitaceæ. | Smyrna, Trieste, France and Spain. | Ext. Coloc. Co. 1 in 4½.<br>Pil. „ „ 1 in 6.<br>„ „ „ et Hyos. 1 in 9 | 17 |
| Aurantiaceæ. | Malabar and Coromandel. | Ext. Bælæ Liq. 1 in 1. | 18 |

## DRAWER H

| NAME. | PART USED. | WHENCE OBTAINED. |
|---|---|---|
| Cinnamon. | Inner bark. | Cinnamomum zeylanicum |
| Cassia. | Inner bark. | Cinnamomum Cassia. |
| Orange Peel. | Rind of fruit. | Citrus vulgaris, v. Bigaradia. |
| Lemon. | Rind of fruit. | Citrus limonum. |
| Liquorice. | Root. | Glycyrrhiza glabra. |
| Irish Moss. | Entire Alga. | Chondrus Crispus. |
| Iceland Moss. | Lichen. | Cetraria islandica. |
| Senega. | Root. | Polygala Senega. |
| Elder Flowers. | Flowers. | Sambucus nigra. |
| Serpentary. | Rhizome. | Aristolochia Serpentaria. |
| Red Rose. | Unexpanded petals. | Rosa Gallica. |
| Hops. | Strobiles. | Humulus Lupulus. |
| Worm Seed. | Florets. | Artemisia Cina. |
| Quassia. | Wood in chips and raspings. | Picræna excelsa. |
| Sassafras. | Root in chips. | Sassafras officinale. |
| Chiretta. | Entire plant. | Ophelia Chirata. |
| Dulcamara. | Young branches. | Solanum Dulcamara. |
| Savin. | Dried tops. | Juniperus Sabina. |
| Mezereon. | Dried bark. | Daphne Mezereum, D. Laureola. |

# DRAWER H.

| NATURAL ORDER. | HABITAT. | PREPARATIONS. | NO. |
|---|---|---|---|
| Lauraceæ. | Ceylon. | Aqua Cinnam. 1 in 8.<br>Ol. „<br>Pulv. C. Comp. 1 in 3.<br>Tinct. Cinnam. 1 in 8, &c. | 1 |
| Lauraceæ. | China and Java. | Non-official. | 2 |
| Aurantiaceæ. | Southern Europe. | Inf. Aurant. 1 in 20.<br>„ „ Comp. 1 in 40.<br>„ Gentian Com.<br>Mist. Gentian.<br>Syr. Aurant. 1 Tinct. in 8.<br>Tinct. „ 1 in 10.<br>„ Recent. 3 in 10.<br>„ Gentian Comp.<br>Vinum Aurant. | 3A |
| „ | „ „ | Ol. Limonis.<br>Succus „<br>Syrup „<br>Tinct. „ 1 in 8, &c. | 3B |
| Leguminosæ. | Cultivated in Britain. | Ext. Glycyrrh.<br>„ „ Liq.<br>Pulv. Glycyrrh. Comp. 1 in 5, &c. | 4 |
| Algæ. | West Coast of Ireland. | Non-official. | 5 |
| Lichenes. | Northern Europe. | Dec. Cetrariæ, 1 in 20. | 6 |
| Polygalaceæ. | North America. | Inf. 1 in 20.<br>Tinct. Senegæ, 1 in 8. | 7 |
| Caprifoliaceæ. | Indigenous. | Aqua Sambuci, 1 in 1. | 8 |
| Aristolochiaceæ. | North America. | Inf. Serpentariæ, 1 in 40.<br>Tinct. „ 1 in 8. | 9 |
| Rosaceæ. | Cultivated in Britain. | Conf. Rosæ Gal. 1 in 4.<br>Inf. „ 1 in 40.<br>Syr. „ 1 in 17½. | 10 |
| Cannabinaceæ. | England. | Ext. Lupuli.<br>Inf. „ 1 in 20.<br>Tinct. „ 1 in 8. | 11 |
| Compositæ. | Russia. | Santonin. | 12 |
| Simarubaceæ. | Jamaica. | Ext. Quassiæ.<br>Inf. „ 1 in 80.<br>Tinct. „ 1 in 27. | 13 |
| Lauraceæ. | North America. | Dec. Sarsæ Co. | 14 |
| Gentianaceæ. | Northern India. | Inf. Chiratæ, 1 in 40.<br>Tinct. „ 1 in 8. | 15 |
| Solanaceæ. | Indigenous. | Inf. Dulcamaræ, 1 in 10. | 16 |
| Coniferæ. | Cultivated in Britain. | Tinct. Sabinæ, 1 in 8.<br>Ung. Sabinæ (fresh tops) 1 in 2½. | 17 |
| Thymelaceæ. | „ „ | Dec. Sarzæ Co.<br>Ext. Mezerei Æth. | 18 |

## DRAWER I.

| NO. | NAME. | PART USED. | WHENCE OBTAINED. |
|---|---|---|---|
| 1 | Balsam of Peru. | Balsam. | Myroxylon Pereiræ. |
| 2 | Balsam of Tolu. | Balsam. | Myroxylon Toluifera. |
| 3 | Storax. | Balsam. | Liquidambar orientale. |
| 4 | Elemi. | Resin. | Canarium commune. |
| 5 | Kamala. | Glands of Capsules. | Rottlera tinctoria. |
| 6 | Elaterium. | Sediment of juice of fruit. | Ecballium officinarum. |
| 7 | Indigo. | Blue pigment. | Indigofera tinctoria. |
| 8 | Litmus. | Blue pigment. | Roccella tinctoria. |
| 9 | Dragon's Blood. | Resin. | Calamis Draco. |
| 10 | Red Sandal Wood. | Wood. | Pterocarpus santalinus. |
| 11 | Wheat Starch. | Starch. | Triticum vulgare. |
| 12 | Manna. | Exudation. | Fraxinus Ornus.<br>F. rotundifolia. |
| 13 | Castor. | Preputial follicles. | Castor fiber. |
| 14 | Spigelia. | Entire herb. | Spigelia Marilandica. |
| 15 | Saffron. | Stigma and part of style. | Crocus sativus. |
| 16 | Cloves. | Unexpanded flowers. | Caryophyllus aromaticus. |
| 17 | Bitter Almonds. | Seeds. | Amygdalus communis, v. amara. |
| 18 | Sweet Almonds. | Seeds. | Amygdalus communis v. dulcis. |

## DRAWER I.

| NATURAL ORDER. | HABITAT. | PREPARATIONS. | NO. |
|---|---|---|---|
| Leguminosæ. | San Salvador. | No B.P. prep. | 1 |
| Leguminosæ. | New Granada. | Syr. Tolu.<br>Tinct. " 1 in 8.<br>Tinct. Benzoin Co. | 2 |
| Altingiaceæ. | Smyrna. | Tinct. Benzoin Co. | 3 |
| Amyridaceæ. | Manilla. | Ung. Elemi 1 and 4. | 4 |
| Euphorbiaceæ. | India. | No. B.P. Prep. | 5 |
| Cucurbitaceæ. | Cultivated in Britain. | Pulv. Elaterii Co. 1 in 10. | 6 |
| Leguminosæ. | India, chiefly Bengal. | Indigo Sulphate Solution. | 7 |
| Lichenes. | Imported from Holland. | Tinct. Litmus 1 in 10. | 8 |
| Palmaceæ. | Singapore, Batavia. | Non-official. | 9 |
| Leguminosæ. | Ceylon. | Tinct. Lavand Co. | 10 |
| Graminaceæ. | Indigenous. | Glycerinum Amyli.<br>Mucilago " 12 grs. to fl. oz. | 11 |
| Oleaceæ. | Sicily. | No B.P. prep. | 12 |
| Rodentia. | Hudson's Bay. | Tinct. Castori 1 in 20. | 13 |
| Loganiaceæ. | North America. | Non-official. | 14 |
| Iridaceæ. | Spain and France. | Tinct. Croci, 1 in 20. | 15 |
| Myrtaceæ. | Penang, Bencoolen, and Amboyna. | Inf. Caryophyl. 1 in 40. | 16 |
| Rosaceæ. | Southern Europe, Mogadore. | Ol. Amygdal.<br>Ol. Amygd. Essent. | 17 |
| Rosaceæ. | Malaga. | Mist. Amygdal.<br>Ol. "<br>Pulv. " 8 in 13. | 18 |

## DRAWER J.

| NO. | NAME. | PART USED. | WHENCE OBTAINED. |
|---|---|---|---|
| 1 | Galangal. | Root. | Alpinia officinarum. |
| 2 | Ginger. | Scraped rhizome. | Zingiber officinale. |
| 3 | Orris. | Rhizome. | Iris florentina. |
| 4 | Birthwort. | Root. | Aristolochia longa. |
| 5 | Long Turmeric. | Rhizome. | Cucuma longa. |
| 6 | Round Turmeric. | Rhizome. | „ rotunda. |
| 7 | Alkanet. | Root. | Anchusa tinctoria. |
| 8 | Logwood. | Sliced duramen. | Hæmatoxylon campechianum. |
| 9 | Squill. | Sliced bulb. | Urginea Scilla. |
| 10 | Colchicum. | Sliced corm. | Colchicum autumnale. |
| 11 | Calumba. | Root. | Jateorhiza palmata. |
| 12 | Sumbul. | Root. | Euryangium sumbul. |
| 13 | Male Fern. | Rhizome. | Aspidium Filix Mas. |
| 14 | White Hellebore. | Rhizome. | Veratrum album. |
| 15 | Green Hellebore. | Rhizome. | V. viride. |
| 16 | Black Hellebore. | Rhizome. | Helleborus niger. |
| 17 | Arnica. | Rhizome. | Arnica montana. |
| 18 | Valerian. | Root. | Valeriana officinalis. |

## DRAWER J.

| NATURAL ORDER. | HABITAT. | PREPARATIONS. | NO. |
|---|---|---|---|
| Zingiberaceæ. | China and America. | Non-official. | 1 |
| Zingiberaceæ. | West Indies, Africa, &c. | Syrup.<br>Tinct. Zingib. Fort. 1 in 2.<br>,, ,, 1 in 8.<br>Pulv. Cinnam. Co. 1 in 3. | 2 |
| Iridaceæ. | Leghorn and Trieste. | Non-official. | 3 |
| Aristolochiaceæ. | Indigenous. | Non-official. | 4 |
| Zingiberaceæ. | Bengal and China. | Paper.<br>Tinct. | 5 |
| Zingiberaceæ. |  | Paper.<br>Tinct. | 6 |
| Boraginaceæ. | Southern Europe, Asia Minor. | Non-official. | 7 |
| Leguminosæ. | Campeachy, Honduras and Jamaica. | Dec. Hæmatoxyli, 1 in 20.<br>Ext. ,, | 8 |
| Liliaceæ. | Mediterranean Coast. | Acetum Scillæ, 1 in 8.<br>Oxymel ,,<br>Pil. Ipec. c. Scillâ.<br>Pil. Scillæ Co. 1 in 5.<br>Syrup.<br>Tinct. Scillæ, 1 in 8. | 9 |
| Melanthaceæ. | Indigenous. | Ext. Colch. (fresh corm).<br>,, ,, Acet. ,,<br>Vin. ,, 1 in 5 (dried). | 10 |
| Menispermaceæ. | Eastern Africa. | Ext. Calumbæ, 1 from 8.<br>Inf. ,, 1 in 20.<br>Mist Ferri Aromat.<br>Tinct. Calumbæ, 1 in 8. | 11 |
| Umbelliferæ. | Russia and India. | Tinct. Sumbul, 1 in 8. | 12 |
| Filices. | Indigenous. | Ext. Filicis Liq. | 13 |
| Melanthaceæ. | Alps, Pyrenees, &c. | Non-official. | 14 |
| Melanthaceæ. | Canada and United States. | Tinct. Verat. Vir. 1 in 5. | 15 |
| Ranunculaceæ. | Southern and Eastern Europe. | Non-official. | 16 |
| Compositæ. | Middle and Southern Europe. | Tinct. Arnicæ, 1 in 20. | 17 |
| Valerianceæ. | Indigenous. | Inf. Valer. 1 in 40.<br>Tinct. ,, 1 in 8.<br>,, ,, Ammon. 1 in 8. | 18 |

# DRAWER K

| NO. | NAME. | PART USED. | WHENCE OBTAINED. |
|---|---|---|---|
| 1 | Broom. | Tops. | Sarothamnus Scoparius. |
| 2 | Castor Oil. | Seeds. | Ricinus communis. |
| 3 | Caraway. | Fruits. | Carum Carui. |
| 4 | Copaiba. | Oleo-resin. | Copaifera multijuga. |
| 5 | Mulberry. | Ripe Fruit. | Morus nigra. |
| 6 | Tobacco. | Leaves. | Nicotiana Tabacum. |
| 7 | Raisins. | Dried Fruit. | Vitis vinifera. |
| 8 | Cacao Butter. | Concrete oil. | Theobroma Cacao. |
| 9 | Prepared Lard. | Abdominal fat. | Sus scrofa. |
| 10 | Honey. | Saccharine secretion. | Apis mellifica. |
| 11 | Musk. | Dried secretion. | Moschus moschiferus. |
| 12 | Carded Cotton. | Hairs of seeds. | V. S. of Gossypium. |
| 13 | Treacle. | Residue of refining sugar. | Saccharum officinarum. |
| 14 | Tamarinds. | Pulp of fruit. | Tamarindus Indica. |
| 15 | Canada Balsam. | Oleo-resin. | Abies balsamea. |
| 16 | Pearl Barley. | Husked seeds. | Hordeum distichon. |
| 17 | Black Snake Root. | Rhizome. | Actæa racemosa. |
| 18 | Indian Aconite. | Root. | Aconitum ferox. |

## DRAWER K.

| NATURAL ORDER. | HABITAT. | PREPARATIONS. | NO. |
|---|---|---|---|
| Leguminosæ. | Indigenous. | Dec. Scoparii (dried), 1 in 20.<br>Succus „ (fresh), 3 in 4. | 1 |
| Euphorbiaceæ. | Calcutta. | Ol. Ricini.<br>Collodium flexile. | 2 |
| Umbelliferæ. | Southern Europe. | Aqua Carui, 1 in 10.<br>Ol. Carui. | 3 |
| Leguminosæ. | Valley of Amazon. | Ol. Copaibæ. | 4 |
| Moraceæ. | Cultivated in Britain. | Syrup Mori (juice), 1 in 2. | 5 |
| Atropaceæ. | Virginia. | Enema Tabaci, 20 grs. to 8 ozs. | 6 |
| Vitaceæ. | Southern Europe. | Tinct. Card. Comp.<br>Tinct. Sennæ. | 7 |
| Sterculaceæ, Byttneriaceæ. | Mexico and West Indies. | Various suppositories. | 8 |
| Pachydermata, Mammalia. | | Adeps Benzoat.<br>Ung. Simplex, 3 in 8. | 9 |
| Hymenoptera, Insecta. | | Mel. Boracis.<br>Mel. Depurat.<br>Oxymel. | 10 |
| Ruminantia, Mammalia. | India and China. | No B.P. prep. | 11 |
| Malvaceæ. | North America. | Pyroxylin. | 12 |
| Graminaceæ. | West Indies. | Various pills. | 13 |
| Leguminosæ. | West and East Indies. | Conf. Sennæ. | 14 |
| Coniferæ. | Canada. | Charta Epispastica.<br>Collodium flexile. | 15 |
| Graminaceæ. | Cultivated in Britain. | Dec. Hordei. | 16 |
| Ranunculaceæ. | North America. | Official in United States' Pharmacopœia. | 17 |
| Ranunculaceæ. | India (Nepal). | Non-official. Aconitia. | 18 |

## DRAWER L.

| NO. | NAME. | PART USED. | WHENCE OBTAINED. |
|---|---|---|---|
| 1 | Yellow Root. | Rhizome (dried), and rootlets. | Hydrastis Canadensis. |
| 2 | Gulancha. | Stems and roots. | Tinospora cordifolia. |
| 3 | Maw Seed. | Seed. | Papaver somniferum. |
| 4 | Blood Root. | Rhizome (dried). | Sanguinaria Canadensis. |
| 5 | Kokum Butter. | Concrete Oil. | Garcinia Indica. |
| 6 | Gurjun Balsam, Wood Oil. | Oleo-resin. | Dipterocarpus turbinatus. |
| 7 | Marshmallow. | Root (scraped and dried). | Althæa officinalis |
| 8 | Cocoa Nibs. | Seed. | Theobroma Cacao. |
| 9 | Guarana. | Seed. | Paullinia sorbilis. |
| 10 | Guaiacum. | Wood. | Guaiacum officinale. |
| 11 | Jaborandi. | Leaves and young branches. | Pilocarpus pennatifolius. |
| 12 | Orange Flowers. | Flowers. | Citrus Bigaradia and C. Aurantium. |
| 13 | Buckthorn. | Dried Fruit. | Rhamnus cathartica. |
| 14 | Alder. | Bark. | Rhamnus frangula. |
| 15 | Arnica. | Flowers. | Arnica montana. |
| 16 | Cherry Laurel. | Leaves. | Prunus Lauro cerasus. |
| 17 | Cabbage Rose. | Fresh Petals. | Rosa centifolia. |
| 18 | Quince. | Seeds. | Pyrus Cydonia. |

# DRAWER L.

| NATURAL ORDER. | HABITAT. | PREPARATIONS. | NO. |
|---|---|---|---|
| Ranunculaceæ. | America. | Non-official, B.P.<br>Official in United States' Pharmacopœia. | 1 |
| Menispermaceæ. | Tropical India. | Non-official in B.P.<br>Official in Indian Pharmacopœia. | 2 |
| Papaveraceæ. | Cultivated in Britain. | Non-official. | 3 |
| Papaveraceæ. | Canada. | Official in United States' Pharmacopœia. | 4 |
| Guttiferæ. | India. | Official in Indian Pharmacopœia. | 5 |
| Dipterocarpeæ. | Singapore and Southern India. | Non-official. | 6 |
| Malvaceæ. | South of France, Spain. Cultivated in Britain. | Syrup Althææ, P.L. | 7 |
| Sterculiaceæ, Byttneriaceæ. | Mexico and West Indies. | Prepared Cocoa. | 8 |
| Sapindaceæ. | Brazil. | Non-official. | 9 |
| Zygophyllaceæ. | St. Domingo and Jamaica. | Decoct. Sarzæ Comp. | 10 |
| Rutaceæ. | Brazil. | Non-official. | 11 |
| Aurantiaceæ. | South of Europe. | Aq. Flor. Aurant.<br>Ol.<br>Syrup. | 12 |
| Rhamnaceæ. | Indigenous. | Succus.<br>Syrup. | 13 |
| Rhamnaceæ. | Germany. | Non-official B.P.<br>Official in German Pharmacopœia. | 14 |
| Compositæ. | Southern Europe. | Tinct. German Pharmacopœia. ʒj to ℥j. Sp. Rectif. | 15 |
| Rosaceæ. | Cultivated in Britain. | Aqua. | 16 |
| Rosaceæ. | Cultivated in Britain. | Aq. Rosæ.<br>Mist. Ferri Comp.<br>Troch. Bismuth. | 17 |
| Rosaceæ. | Western Asia. Cultivated in Southern Europe. | Decoct. Cydon.<br>Non-official. | 18 |

## DRAWER M.

| NO. | NAME. | PART USED. | WHENCE OBTAINED. |
|---|---|---|---|
| 1 | White Sandal. | Wood. | Santalum album. |
| 2 | Galbanum. | Gum-resin. | Ferula Galbaniflua. |
| 3 | Spearmint. | Flowering Plant. | Mentha viridis. |
| 4 | Elecampane. | Dried Root. | Inula Helenium. |
| 5 | Lactucarium. | Inspissated Juice. | Lactuca virosa. |
| 6 | Stramonium. | Leaves. | Datura Stramonium. |
| 7 | Stramonium. | Seeds. | Datura Stramonium. |
| 8 | Pennyroyal. | Flowering plant. | Mentha Pulegium. |
| 9 | Long Pepper. | Dried Spadices. | Piper officinarum.<br>P. Longum. |
| 10 | Willow. | Bark. | Salix fragilis, var. species. |
| 11 | Larch. | Bark. | Larix Europœa. |
| 12 | Venice Turpentine. | Oleo-resin. | Larix Europœa. |
| 13 | Juniper. | Fruit. | Juniperus communis. |
| 14 | Sarsaparilla. | Root. | Smilax officinalis. |
| 15 | Vanilla. | Pods. | Vanilla planifolia. |
| 16 | Tous les Mois. | Starch. | Canna edulis. |
| 17 | Sweet Flag. | Rhizome. | Acorus Calamus. |
| 18 | Club Moss. | Spores. | Lycopodium clavatum. |

## DRAWER M.

| NATURAL ORDER. | HABITAT. | PREPARATIONS. | NO. |
|---|---|---|---|
| Santalaceæ. | East Indies. | Non-official. | 1 |
| Umbelliferæ. | India and the Levant. | Emp. Galban. | 2 |
| Labiatæ. | Indigenous. | Aq. | 3 |
| Compositæ. | Southern Europe.<br>Cultivated in England. | Non-official. | 4 |
| Compositæ. | Indigenous. | Non-official.<br>Ext. Lactucæ B.P. | 5 |
| Atropaceæ. | Cultivated in Britain. | No B.P. prep. | 6 |
| Atropaceæ. | Cultivated in Britain. | Ext.<br>Tinct. 1 in 8. | 7 |
| Labiatæ. | Cultivated in Britain. | Non-official. | 8 |
| Piperaceæ. | India, Singapore, Batavia. | Non-official. | 9 |
| Salicaceæ. | Indigenous. | Salicin.<br>Acid Salicylic. | 10 |
| Coniferæ. | Central Europe.<br>Cultivated in Britain. | Tinct. 1 in 8. | 11 |
| Coniferæ. | Central Europe.<br>Cultivated in Britain. | Non-official. | 12 |
| Coniferæ. | Northern Europe.<br>Cultivated in Britain. | Ol.<br>Spirit. | 13 |
| Smilaceæ. | Central America.<br>Imported from Jamaica. | Decoct. 1 in 8.<br>„ Comp. 1 in 8.<br>Ext. liquid. | 14 |
| Orchidaceæ. | Eastern Mexico. | Non-official. | 15 |
| Marantaceæ. | Barbadoes. | Non-official. | 16 |
| Acoraceæ. | Indigenous. | Non-official. | 17 |
| Lycopodiaceæ. | Indigenous, and imported from Central and Northern Europe. | Non-official. | 18 |

# DRAWER N.

| NO. | NAME. | PART USED. | WHENCE OBTAINED. |
|---|---|---|---|
| 1 | Ceylon Moss. | Entire Alga. | Gracilaria Lichenoides. |
| 2 | Isinglass. | Swimming Bladder. | Acipenser. |
| 3 | Pepsin. | Mucous lining of stomach. | Various. |
| 4 | Ox Gall. | Purified Bile. | Bos Taurus. |

## DRAWER N.

| NATURAL ORDER. | HABITAT. | PREPARATIONS. | NO. |
|---|---|---|---|
| Algæ. | Ceylon. | Non-official B.P.<br>Official Indian Pharm. | 1 |
| Pisces. (Class.) | Russia. | Gelatin, 10 grains to 1 fluid ounce | 2 |
| Mammalia. | | Pulv. | 3 |
| Ruminantia. | | Fel. Bovin purif. | 4 |

# OPIUM PREPARATIONS.

**Confect.** Opii, 1 in 40.
**Emplast.** Opii, 1 in 10.
**Enema** ,, ½ drm. Tinct. to 2 oz.
**Ext.** Opii, 1 from 2.
,, ,, Liq. 1 Ext. in 20.
**Liniment,** 1 Tinct. in 2.
**Morphia.**
**Morphiæ** Acetas.
  Liquor, 1 in 120.
  Inject. Hypoderm. 1 gr. in 12 mins.
**Morphiæ** Hydrochloras.
,, Liquor, 1 in 120.
  Suppositoria, ½ gr. in each.
  id. c. Sapone, ½ gr. in each.
  Trochisci, $\frac{1}{36}$ gr. in each.
  et Ipecac. $\frac{1}{36}$ gr. in each.
Pil. Ipecac. c. Scillâ, 1 in 23½.
Pil. Plumbi. c. Opio, 1 in 8.
,, Saponis Comp. 1 in 5½.
Pulv. Cretæ Arom. c. Opio, 1 in 40.
,, Ipecac. Comp. 1 in 10.
,, Kino Comp. 1 in 20.
,, Opii Comp. 1 in 10.
Suppos. Plumbi. Comp. 1 grain in each.
Tinct. Camph. Comp. 2 grs. to 1 oz.
,, Opii, 1 in 13½.
,, ,, Amm. 5 grs. to 1 oz.
Troch. Opii, $\frac{1}{10}$ gr. Ext. in each.
Ung. Gallæ c. Opio, 32 grs. to 1 oz.
Vin. Opii, 1 Ext. in 20.
Apomorphia, Codeia.
Meconia, Meconic Acid.
Narceia, Narcotia.
Papaverine, Thebaia.
} Non-official.

*These are the chief preparations, but there are various others.*

# APPENDIX III.

## The Lemon and Lemon Juice.

The London Market is chiefly supplied with Lemons from the following places:—

| 1st GROUP. | 2nd GROUP. |
|---|---|
| MESSINA. | MALAGA. |
| PALERMO. | LISBON. |
| NAPLES. | OPORTO. |
| CATANIA. | SEVILLE. |
| NICE. | VIANNA. |

The fruit in the first group is esteemed to be the best because it is gathered in October, when in the language of the trade, "it has been ripened by Dew." The fruit in the second group being of a later habit cannot be gathered till after October, when it has been "ripened by Rain."

Fruit slowly ripened under the gentle moisture of dew, is not only of a finer quality but will keep sound for three or four months: that more quickly ripened by rain, for not so many weeks.

It is a popular adage in England that Oranges are sweeter after Christmas than before. The same kind of change takes place in the lemon, so that the juice of a new lemon in November is more acid than that of an old one in May.

Hence lemon juice pressed in winter and carefully kept is to be preferred to later juice for pharmaceutical purposes. Lemons in summer are often so deficient in acid that the juice requires the addition of citric acid to neutralize a tabular quantity of Bicarbonate of Potash: or the saturation table must be corrected by a reduction of the alkaline salt.

The fine flavour of good lemon juice is much impaired by either boiling or filtration.

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| 4 | 1/9 | 7 | 4/6 | 10 | 9/0 |

| | £ | s. | d. |
|---|---|---|---|
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| Grad. on stem with enamelled back | 5/0 | 6/0 | 5/6 | " |

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|---|---|---|---|
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| Stand for do., 5/0; complete | 0 | 10 | 0 |
| U form, to show the volume of H in HCl, with one Stopcock, 5/6; with stand | 0 | 13 | 0 |
| Do., to show that 3 vols. H combine with 1 vol. N to form $NH_3$, each, 6/6 and 7/6; complete 14/0 and | 0 | 16 | 0 |
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| 48 | 2/3 | 2/6 | 160 | 6/3 | 7/3 |

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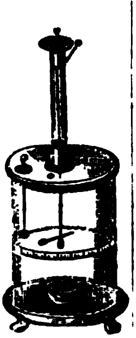

**BURETTE STANDS—**

| | | | |
|---|---|---|---|
| Teak wood for one, 2/0; for two | 0 | 2 | 6 |
| Black wood, with clamp for one Burette, 3/0; for two | 0 | 4 | 6 |
| Mahogany do. do. 4/6; for two | 0 | 6 | 6 |
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| 9 | ¼ | 4*d* | 3 9 | 4 | 2½ | 10*d* | 9 0 |
| 8 | ½ | 5*d* | 4 6 | 3 | 3½ | 1/0 | 10/6 |
| 7 | ¾ | 6*d* | 5 6 | 2 | 5 | 1/2 | 12/6 |
| 6 | 1 | 7*d* | 6/6 | 1 | 8 | 1,6 | 16/0 |
| 5 | 1½ | 8*d* | 7,0 | | | | |

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| inches square | 6 | 7 | 8 | 9 inches square. |
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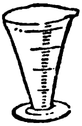

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|---|---|---|---|
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|---|---|---|---|---|
| DUTCH, very thick and coarse | per quire | 0 | 2 | 6 |
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|---|---|---|---|---|---|
| 1 | 3*d.* | 2/9 | 20 | 9*d.* | 8/0 |
| 2 | 3*d.* | 3/0 | 24 | 10*d.* | 9/0 |
| 4 | 4*d.* | 3 9 | 32 | 11*d.* | 10,0 |
| 6 | 5*d.* | 4 6 | 48 | 1/1 | 11/7 |
| 8 | 6*d.* | 5 6 | 64 | 1/2 | 12 6 |
| 12 | 7*d.* | 6/6 | 100 | 1,6 | 16,0 |
| 16 | 8*d.* | 7/3 | 160 | 2/0 | 21,6 |

| GERMAN—ozs. | 2 | 4 | 8 | 12 | 16 | 24 | 32 ozs cap. |
|---|---|---|---|---|---|---|---|
| price | 2/0 | 2/3 | 3/0 | 4/0 | 5/0 | 6/0 | 7/0 per doz. |

GAUGED and marked in neck, Grains—

| to contain | 500 | 1,000 | 5,000 | 10,000 grains. |
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| 1¼ | 3*d.* | 2/9 | 6 | 1/2 | 13/0 |
| 2 | 4*d.* | 3/9 | 7 | 1/6 | 16/0 |
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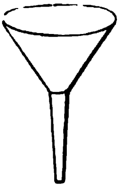


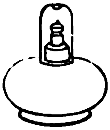
**ENGLISH GLASS**, plain or ribbed—

| in. diam. | 1 | 1¼ | 2 | 2½ | 3 | 4 | 5 | 6 | in. diam. |
|---|---|---|---|---|---|---|---|---|---|
| price | 1/6 | 1/9 | 2/0 | 2/6 | 3/0 | 4/0 | 6/0 | 9/0 | per doz. |

| | | £ | s. | d. |
|---|---|---|---|---|
| | per lb. | | | |
| **GLASS TUBING, SOFT**, for bending, all sizes | " | 0 | 1 | [illegible] |
| Do. do. **HARD**, for combustions, finest Bohemian | " | 0 | 1 | 4 |
| Do. do. Barometer and Thermometer | " | 0 | 3 | |

**GRADUATED MEASURES**, Glass—

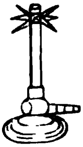
| 1 | 2 drm. | ½ | 1 | 2 | 4 | 6 | 8 | 10 | 16 | 20 | 40 ozs. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| price 9*d.* | 1/0 | 8*d.* | 9*d.* | 1/0 | 1/3 | 1/6 | 1/9 | 2/0 | 2/3 | 2/6 | 4/0 each. |



| **HYDROMETERS**, &c.— | £ | s. | d. |
|---|---|---|---|
| Argentometer, with Immersion Tube .... each 1/6 and | 0 | 2 | 6 |
| Beaume's, for light or heavy Fluids ......each 1/6 and | 0 | 2 | [illegible] |
| Lactometer, complete, 1/6 and 2/3 ........Ivory Scale | 0 | 3 | 0 |
| Saccharometer, 2/6 .........................Ivory Scale | 0 | 3 | 0 |
| Salinometer for Aquarium, 1/6; for Sea Water ...... | 0 | 2 | 6 |
| Sikes', with Weights, Thermometer, and Tables complete .................................... | 3 | 3 | 0 |
| Specific Gravity, for Acids, &c., 1,000—1,850 .......... | 0 | 2 | 6 |
| Do. for Spirits, 700—1,000 .............. | 0 | 2 | 6 |
| Do. for Spirits, from 40° under to 60° over proof, 2/6 ............Ivory Scale | 0 | 3 | 0 |
| TWADDEL'S, Nos. 1 to 6, each 1/6..........per doz. | 0 | 15 | 0 |
| Urinometer, Ivory Scale, in Leather Case ............ | 0 | 3 | 0 |
| Do. with graduated Trial Jar in ditto ........ | 0 | 4 | 6 |

**HYDROMETER IMMERSION TUBES**—

| in. high | 6 | 8 | 10 | 12 | 14 | in. high. |
|---|---|---|---|---|---|---|
| price | 8*d.* | 10*d.* | 1/0 | 1/3 | 1/6 | each. |
| per doz. | 7/6 | 9/0 | 11/0 | 13/6 | 16/0 | per doz. |



| | £ | s. | d. |
|---|---|---|---|
| **LAMPS, BERZELIUS'**, Brass, on Stand, with Rings, &c.............................................. | 1 | 0 | |
| **GAS**, Bunsen's ..............................1/3, 2/3, and | 0 | 3 | 6 |
| Rose for ditto .................1/0, 1/3, 1/9, and | 0 | 2 | [illegible] |
| Star support for ditto, with Chimney ..6*d.* 8*d.* and | 0 | 0 | 10 |

**SPIRIT, GLASS**, with Stoneware or Brass Tube wick Holder—

| ozs. cap. | 1 | 2 | 4 | 8 ozs. cap. |
|---|---|---|---|---|
| price | 9*d.* | 10*d.* | 1/0 | 1/3 each. |
| with Screw Cap | 1/3 | 1/6 | 1/9 | 2/0 |

M. JACKSON & CO., 65, BARBICAN, LONDON.

# SCIENTIFIC APPARATUS.

# M. JACKSON & Co.,

(J. ORME & H. M. CAPNER,)

MANUFACTURERS OF EVERY DESCRIPTION OF

**Apparatus for use in Teaching or Experimenting in the Sciences of Chemistry, Electricity, Magnetism, Acoustics, Light, Heat, Hydrostatics, Mechanics, &c.**

**Importers of finest Bohemian Glass, Berlin Porcelain, Pure Chemicals for Analysis, &c.**

## EXTRACTS FROM M. JACKSON & CO.'S PRICE LISTS.

### CHEMICAL.

| | £ | s. | d. |
|---|---|---|---|
| **ARSENIC APPARATUS,** Marsh's .............. | 0 | 6 | 0 |

**BASINS, FOR EVAPORATING—**

**BERLIN PORCELAIN,** finest quality, with Spout—

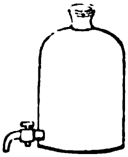
| No. | Inch diam. | Price each. | Price per doz. | No. | Inch diam. | Price each. | Price per doz. |
|---|---|---|---|---|---|---|---|
| 00 | 2¾ | 5*d*. | 4/0 | 6 | 6 | 2/0 | 21/0 |
| 0 | 3 | 6*d*. | 4/9 | 7 | 7 | 2/6 | 27/0 |
| 1 | 3¼ | 9*d*. | 8/3 | 8 | 8½ | 3/0 | 33/0 |
| 2 | 3½ | 10*d*. | 9/0 | 9 | 10 | 5/0 | 54/0 |
| 3 | 4 | 1/0 | 10/6 | 10 | 12 | 7/6 | 82/0 |
| 4 | 4¼ | 1/3 | 13/3 | 11 | 14 | 9/0 | 100/0 |
| 5 | 4½ | 1/8 | 18/0 | 12 | 15½ | 25/0 | 280/0 |

**MEISSEN** (Dresden) Porcelain, with Spout, shallow and very thin—

| inch diam. | 2½ | 3½ | 4½ | 5 | 5½ | 6½ | 7½ | 8½ | 10 | 11 | 12 inch diam. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| price | 4*d*. | 5*d*. | 8*d*. | 10*d*. | 1/3 | 1/9 | 2/4 | 3/0 | 4/6 | 5/0 | 6/6 each. |

**M. JACKSON & CO., 65, BARBICAN, LONDON.**

# EXTRACTS FROM M. JACKSON & CO.'S PRICE LISTS.

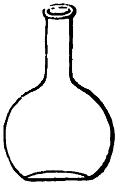


## BASINS, FOR EVAPORATING—

**GERMAN** Porcelain, with Spout, glazed inside *(a cheap basin for ordinary use).*

| No. | Inch diam. | Price each. | Price per doz. | No. | Inch diam. | Price each. | Price per doz. |
|---|---|---|---|---|---|---|---|
| 1 | 2½ | 3*d*. | 2/6 | 6 | 5 | 7*d* | [illegible] |
| 2 | 3 | 4*d*. | 3/3 | 7 | 5½ | 9*d* | [illegible] |
| 3 | 3½ | 4*d*. | 3/6 | 8 | 6 | 1/0 | 10/[illegible] |
| 4 | 4 | 5*d*. | 4/3 | 9 | 6½ | 1/3 | 12/[illegible] |
| 5 | 4½ | 6*d*. | 5/0 | | | | |

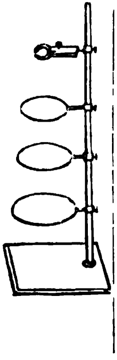
## BEAKERS, for Hot Solutions, finest Bohemian Hard Glass, and of the best make—



| No. | Ozs. cap. | Inch deep. | Price each. | Price doz. | No. | Ozs. cap. | Inch deep. | Price each. | Price doz. |
|---|---|---|---|---|---|---|---|---|---|
| 00 | 1 | 1⅜ | 2*d* | 1/9 | 6 | 23 | 5½ | 9*d* | 8/0 |
| 0 | 1½ | 2 | 3*d* | 2/9 | 7 | 32 | 6 | 10*d* | 9/0 |
| 1 | 3½ | 2½ | 4*d* | 3/6 | 8 | 48 | 7½ | 1/0 | 10/0 |
| 2 | 4½ | 3 | 5*d* | 4/6 | 9 | 67 | 8½ | 1/3 | 12/[illegible] |
| 3 | 7 | 3½ | 6*d* | 5/6 | 10 | 90 | 9 | 1/6 | 15/6 |
| 4 | 10 | 4 | 7*d* | 6/3 | 11 | 120 | 10 | 1/8 | 17/[illegible] |
| 5 | 16 | 4½ | 8*d* | 7/3 | 12 | 154 | 11 | 1/10 | 19/0 |

## BEAKERS, similar to the above, nested—

| Sets of | Nos. | Price per set. | Sets of | Nos. | Price per set. |
|---|---|---|---|---|---|
| 3 | 00 to 1 | 7*d*. | 5 | 2 to 6 | 2/6 |
| 3 | 1 „ 3 | 1/0 | 6 | 0 „ 5 | 2/3 |
| 5 | 0 „ 4 | 1/8 | 8 | 1 „ 8 | 4/[illegible] |
| 5 | 1 „ 5 | 2/0 | 12 | 1 „ 12 | [illegible] |



## BLOWPIPES—

| | | £ | *s.* | *d.* |
|---|---|---|---|---|
| Berzelius', with Platinum Jet | each | 0 | 5 | [illegible] |
| Black's Japanned Tin, 9*d*. Brass do. | „ | 0 | 1 | 6 |
| Herapath's for Bunsen's Burner ........2/3, 2/6, | „ | 0 | 3 | 0 |
| Do. on stand, complete ........6/ | „ | 0 | 7 | 6 |
| **BLOWPIPE TABLE,** with Bellows, double action | | 3 | 15 | 0 |
| **JET** (Herapath), with universal Joint, for above | | 0 | 7 | [illegible] |

## BOTTLES, Bohemian white glass, stoppered—

| ozs. cap. | ½ | 1 | 2 | 4 | 6 | 8 | 12 | 16 | 20 | 40 | ozs. cap. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| price N.M. | 1/6 | 1/8 | 1/10 | 2/3 | 2/8 | 3/0 | 3/6 | 4/0 | 4/6 | 5/6 | per doz. |
| „ W.M. | 1/8 | 2/3 | 2/8 | 3/0 | 3/8 | 4/0 | 4/6 | 5/3 | 5/9 | 7/0 | „ |

## BURETTES—

MOHR'S, with India-rubber Tube and Glass Jet:—

| CC. | | Divs. | Price each. | Grains. | Divs. | Price each. |
|---|---|---|---|---|---|---|
| 20 | in | 200 | 1/10 | 500 | 100 | 2/6 |
| 25 | „ | 250 | 2/0 | 1,000 | 100 | 3/6 |
| 50 | „ | 250 | 2/10 | 1,000 | 200 | 4/0 |
| 50 | „ | 500 | 3/2 | Clips for the above, 4*d*. ea. extra | | |

| MOHR'S, with Glass Stopcock— | £ | *s.* | *d.* |
|---|---|---|---|
| 50 cc. in 250 divs. 5/0 ; 50 cc. in 500 divs. | 0 | 5 | 6 |
| 1,000 grains in 100 divs. 5/6 ; 1,000 grains in 200 divs. | 0 | 6 | 0 |
| ERDMAN'S FLOATS ........each | 0 | 0 | 9 |

**M. JACKSON & CO., 65, BARBICAN, LONDON.**

**The London Medical Bottle Co.,**

MANUFACTURERS OF EVERY DESCRIPTION OF

DISPENSING BOTTLES,

*Suitable for Surgeons and Chemists.*

WORKS :—24, CRANMER ROAD, NORTH BRIXTON, S.W.

WAREHOUSES :—MANOR PLACE, WALWORTH ROAD, S.E.

**SLATTER & CO., Proprietors.**

PRICE LISTS ON APPLICATION.

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**YOUNG'S ARNICATED**

NOTICE.

MR. YOUNG begs to state that he was the FIRST INVENTOR of the

**Arnicated Felt Corn & Bunion PLASTERS.**

Avoid counterfeit preparations, and observe Trade Mark.

TRADE MARK H.Y.

WHITE FELT

**CORN & BUNION PLASTERS**

Have a world-wide reputation. They are acknowledged to be the best in the Market.

FOR SHIPPING PRICE, APPLY TO

**H. YOUNG, 16, Carthusian Street, Aldersgate Street, E.C.**

*May be ordered through the Wholesale Houses.*

N.B.—BE CAREFUL THAT YOUNG'S ARE SUPPLIED.

[TWELFTH EDITION.]

# Materia Medica Examinations

BRITISH PHARMACOPŒIA, 1867.

*The Original Collection of Specimens of the Organic Materia Medica, for the use of*

MEDICAL AND PHARMACEUTICAL STUDENTS.

IN order to assist Students in preparing for the above Examinations, we issue COLLECTIONS of carefully selected and characteristic Specimens of the Roots, Barks, Flowers, Fruits, Leaves, Resins, Gums, &c., of the British Pharmacopœia, 1867. Each Specimen bears a Label containing a description of the source from which the article is derived, its natural order, character, and tests, dose, and names of the Pharmacopœia Preparations into the composition of which it enters. The Student is thus enabled, in the most effective manner, to study the Materia Medica with the actual substance as well as the descriptive text before him.

*Testimonial from* DR. MUTER, *Director of the South-London School of Pharmacy.*

"South-London School of Pharmacy, 11th April, 1878.

"Messrs. Southall Bros. and Barclay.

"Dear Sirs,—I have great pleasure in expressing the satisfaction which the specimens you provided for our Museum have given, and I also am always ready to say a word in favour of your excellent and economical Student's Collection, which I invariably recommend for the use of country Students.

"Yours faithfully, JOHN MUTER."

Testimonials have also been received from Dr. P. W. LATHAM, Professor of Medicine. *Cambridge University;* Dr. GEORGE F. DUFFEY, Fellow and Censor *(Examiner in Materia Medica), King and Queen's College of Physicians, Ireland,* Lecturer on Materia Medica in the Carmichael School of Medicine, Dublin, &c., &c.; PROFESSOR CHAS. B. C. TICHBORNE, Dublin, &c.; also from the EDITORS OF THE PHARMACEUTICAL AND MEDICAL JOURNALS, &c., &c.

**Price of the Collection, including a copy of "The Organic Materia Medica," by W. SOUTHALL, F.L.S., in a neat Wooden Box, 30/- net.**

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CATALOGUES supplied FREE BY POST on Application.

SOUTHALL BROS. & BARCLAY,

*Manufacturing Pharmaceutical Chemists, Birmingham.*

THE SOUTH LONDON

# SCHOOL OF PHARMACY,

## Its Objects, Premises, Syllabus of Lectures, Regulations and Terms.

By WILLIAM BAXTER, Secretary.

**FOURTH EDITION—Revised to January, 1879.**

London:
PUBLISHED AT THE OFFICES OF THE SCHOOL,
CENTRAL PUBLIC LABORATORY,
KENNINGTON CROSS, S.E.

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# PREFACE.

In issuing the present prospectus of the arrangements for the coming session, the management may be excused for referring with pride to the unequalled success attending the efforts of the school in raising the standard of Pharmaceutical education during the last ten years. No better proof of such success can be adduced than the fact that over 1500 persons have duly qualified themselves to practise as pharmacists from the ranks of its students. Much of this success is no doubt owing to the ability of the various lecturers, and especially to the fact that the direction of the Laboratory is entirely under the control of a teacher and analytical chemist, having the experience and high standing in his profession, possessed by Dr. Muter. The school will continue to be devoted, as heretofore, to both classes of students, viz. Major and Minor; but no student is received who has not passed his Preliminary Examination. In addition, there has now also been added a department for the instruction of medical officers and others in Microscopy and General and Food Analysis.

## I. Objects and Aims of the Institution.

As now constituted, the South London School of Pharmacy receives two distinct classes of pupils, and provides a separate course of study to meet the requirements of each class, as follows:—

### Class A.

In this division a long course of study, extending over twelve months, is provided for students who, not having previously attended many classes, desire to commence at the very root of matters, and be fully instructed in Pharmacy and its allied sciences. Provision is made for enabling them to become well acquainted with chemical analysis, both in its commercial bearing and as applied to the detection of adulteration in food and drugs, as well as with practical microscopy. Students commence by attending such of the lectures as they select daily, and the laboratory during three hours a day for the first three months, and thereafter they are allowed to work in the laboratory for the whole day. Leave of absence is given when required for any reasonable purpose. The age of entry in this department is optional, and certificates of attendance are granted. For medical officers and food analysts the lectures are not as a rule required; therefore the instruction is entirely practical, and the attendance optional, as may be arranged in each special case.

### CLASS B.

For students who, having already obtained instruction in the country, or studied by self help, desire to have a shorter course of advanced instruction to enable them to systematize and arrange their ideas. In this class no student is received who has not attained an age of over twenty years. The length of each course is three months, but in the case of men already very nearly proficient special exceptions are occasionally made.

Students entering under this division are expected to strictly comply with the rules as to perfect regularity of attendance and good and studious conduct during their stay in London, Saturday being allowed as a half-holiday. They attend the lectures and laboratory daily. They are also subjected to frequent examination, written and oral, to ascertain their state of progress.

## II. The School Premises

Are situated at 325, Kennington Road, and consist of—

1. The necessary lecture rooms, properly fitted with abundance of diagrams, apparatus, etc.
2. Two complete museums of specimens of materia medica, with special cases presented by old students and others.
3. A museum of pharmaceutical preparations and dispensing department, upheld by Messrs. Knowles and Phillips.
4. An extensive herbarium and collection of manuscript prescriptions.
5. The laboratory (illustrated above), fitted in so complete and elegant a manner that each student has water, gas, fume chamber, and all such appliances within his reach, without leaving his bench. In addition to this, all the students face the demonstrators, and the benches are so arranged that the occupants can work sitting if desired. The table tops are of white enamelled slate, so that habits of exactitude and cleanliness can be well inculcated. All bottles and reagents are found by the school, except those mentioned in the laboratory list. Expensive apparatus of all kinds are lent to the students when required.

Besides the above premises specially for pharmaceutical students, there is the South London Central Public Laboratory, at Kennington Cross, where the secretary's office is situated, and in which the more advanced students are taught general and food analysis.

# III. The Pharmaceutical Educational Course.

The session commences on the 15th of September, and lasts till the 20th of July; and the following courses of lectures, etc., are delivered several times during the session.

## LATIN.

This consists of sixty lessons, and includes—

1. The reading of autograph prescriptions.
2. The parsing and rules of grammar involved in prescriptions.
3. The rendering into good Latin of prescriptions written in English.

Textbook :—Pereira's *Selecta e Prescriptis.*

## BOTANY.

This involves a full course of sixty lectures on structural botany, and conveys an intimate knowledge of the root, stem, leaves, inflorescence, flower, fruit, and seed. The elementary structure of plants, such as cells, vessels, and the various tissues produced by their union, is fully discussed and illustrated by practical use of the microscope. A general knowledge of vegetable physiology is also inculcated. The organs of reproduction are practically taught by dissections conducted on fresh flowers once a week, under the direction of the lecturer.

During the summer months a lecture is delivered once a week, at Mitcham, on Mr. Bridger's herb farm.

*No textbook required in this subject.*

## MATERIA MEDICA.

This course of sixty lectures opens with instruction in the classification of plants and the characters of the chief natural orders, illustrated by diagrams. It then proceeds to take the orders in detail, the portions of each plant used in Pharmacy, both official and non-official, being fully detailed. Their geographical sources, composition, modes of isolating their active principles, and adulterations, being fully described, as well as the preparations into which they enter. A general knowledge of the classification of animals, and a minute description of the drugs, etc., obtained from the animal kingdom, is also given.

**Textbook:** Dr. Muter's *Organic Materia Medica*. Second Edition. Price 12*s*. 6*d*. (At the School Offices, and of Messrs. Simpkin & Marshall, and Messrs. Balliere, Tindall & Cox).

# PHARMACY.

This course lasts three months, and includes—

1. A description of the reasons involved in the processes used in pharmaceutical laboratories, and the best methods of conducting the same.
2. A minute knowledge of the B. P. and the chief non-official preparations usually sold.
3. The strengths, doses, and best modes of administration of the various official preparations.
4. The best methods of dispensing emulsions, pills, plasters, etc.
5. Practical instruction in dispensing and elegant pharmacy.

Textbook :—*The British Pharmacopœia.*

# THEORETICAL CHEMISTRY.

*This subject is taught on Dr. Muter's successful, because eminently systematic, "acidulous radical" method.*

This course of sixty lectures includes—

1. The modern theories of chemistry.
2. The metals and chief basylous radicals.
3. Chlorine, chlorides, hypochlorites, chlorates.
4. Bromine, bromides, and bromates.
5. Iodine, iodides, and iodates.
6. Oxygen, hydrates and oxides of metals.
7. Alcohols and their derivatives, organic acids and their salts.
8. Sulphur, sulphides, sulphites, hyposulphites, sulphates, and sulphur substitution products.
9. Carbon, its oxides and carbonates.
10. Nitrogen, its oxides, acids, and their salts. Nitrogen substitution products.
11. Ammonia and its derivatives, amides, amines, and alkaloids.
12. Phosphorus, its oxides, acids, and their salts.
13. Arsenic, its oxides, acids, and their salts.

14. Hydrocarbons, sugars, glucosides, and other organic products not previously treated of.

**Textbook:** Dr. Muter's *Pharmaceutical Chemistry.* Second Edition. Price 10*s.* 6*d.* (At the School Offices, and of Messrs. Simpkin & Marshall, and Messrs. Balliere, Tindall & Cox.)

# PRACTICAL CHEMISTRY.

## I. JUNIOR COURSE.

(*Three months.*)

This includes—

1. The practical manufacture of the chief chemicals of the B. P., in which the processes are typical.
2. Qualitative analysis, and separation of bases and acids.
3. The practical taking of specific gravities, temperatures, and the measurement of gases.

## II. SENIOR COURSE.

(*Six months.*)

This extends to—

1. Detection of poisons in organic mixtures.
2. Quantitative analysis of B. P. substances, gravimetric and volumetric.
3. Analysis of manures, water, minerals, etc.
4. Microscopic and chemical examination of food and drugs, for detecting adulterations.
5. Elementary organic analysis.

**Textbook:** Dr. Muter's *Analytical Chemistry.* Price 7*s.* 6*d.* (At the School Offices, and of Messrs. Simpkin & Marshall, and Messrs. Balliere, Tindall & Cox.)

## LIST OF APPARATUS REQUIRED BY EACH STUDENT.

test-tube stand, 8 holes and pegs.
1 dozen test-tubes.
1 test-tube brush.
1 nest of three beakers, from 10 oz. downwards.
3 flasks: 1 pint, ½ pint, and 5 ounces.
2 Clarke's test-glasses.
3 funnels: 2½ inch, 3 inch, and 1½ inch.
2 porcelain crucibles.
1 5-oz. measuring glass.
4 evaporating basins: 3 inch, 4 inch, 6 inch, and 8 inch.
¼ lb. glass rod.
¼ lb. glass tubing.
1 foot small india tube for connecting tubing.
2 dozen corks, various.
1 spatula.
1 pair scissors.
1 three-cornered file.
1 round file.
1 blowpipe.
1 pair crucible tongs.
½ quire filtering paper.
platinum wire and foil.
1 piece blowpipe charcoal.
1 towel.
1 sponge.
¼ oz. argentic nitrate.
1 dram platinic chloride.
small pestle and mortar.

The student must also find the alcohol, ether, and chloroform, which he may require.

## IV. Medals and Prizes

Are awarded in DECEMBER, APRIL, and JULY, on the report of the VISITING EXAMINERS; the examinations being written and practical.

1. A BRONZE MEDAL in each of the subjects of CHEMISTRY (senior and junior), BOTANY, MATERIA MEDICA, and DISPENSING and PRACTICAL PHARMACY.
2. To every student gaining more than two-thirds of the total possible marks, a CERTIFICATE of MERIT.
3. The SILVER MEDAL of the Institution, competed for in July and open to all the Bronze Medallists of the year.

## V. Fees.

On and after 15th April, 1879, the fees will be as follows:—

1. PERPETUAL FEE for the whole course of lectures (including admission to the museum) . . . . . . £4 4*s.*

For example, a student entering the School, by payment of this fee, can continue to attend the lectures until the end of the session, and return *as often as he pleases for any number of following sessions without extra expense*, provided he also attends the laboratory.

2. For the Laboratory—

*Junior Course*, per month, £2 2*s.*

*Senior Course*, first month, £4 4*s.*; each succeeding month, £3 3*s.*

By these terms an industrious young man, who has paid attention to his business during his apprenticeship, may thoroughly complete his education as "Chemist and Druggist," so far as the school expenses are concerned, for the very moderate sum of £10 10*s.* The cost of the junior laboratory instruction is exactly one half that usually charged at kindred institutions.

Old students who have already attended the school under the former regulations will be liberally dealt with.

# VI. Conditions of Attendance.

I. Unless from ill health, or by special permission, no student shall at any time be absent from his appointed classes, nor leave the premises during business hours. In cases of absence an explanatory note is required.

II. After the ringing of the bell indicating a class, each student must be settled in his place and ready for work before the entry of the lecturer.

III. Conversation during lecture, or conduct tending to attract the attention of other students from the subjects in hand, is forbidden.

IV. Each student must provide himself with the necessary books recognised by the school, as well as with the small set of laboratory articles, and find his own sponge, towel, and apron.

V. Except on Saturdays, students are to refrain from frequenting public houses, places of public entertainment, billiard rooms, or other such aids to the ruin of their professional prospects.

VI. Students are required to register the address of their lodgings with the Secretary, and notify any change to him.

VII. In event of any damage to institution property, should the perpetrator remain undiscovered for twelve hours, the whole class in the room at the time must subscribe to replace the article broken.

VIII. All apparatus lent to students must be returned clean and in good order, or replaced at their own cost. On leaving for the day, students must clean and arrange their benches, and put away their apparatus in the cupboards.

These Rules are made with a sincere desire to aid the industrious student, and press hardly on no one. Retiring and smoking rooms, as well as an exercise yard, are provided within the walls, and everything is done to make the student comfortable while at school. Any violation of these conditions terminates the student's contract with the school.

5

Butler & Tanner, The Selwood Printing Works, Frome, and London.